

LOCHSA RIVER SUBBASIN ASSESSMENT

Final

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EXECUTIVE SUMMARY

The Lochsa Subbasin is 1,180 square miles of predominantly undeveloped forest land and free flowing streams. Most of the Lochsa River is designated as a Wild and Scenic River and about half the subbasin south of the river is part of the Selway Bitterroot Wilderness Area. The subbasin is above 8,600 feet elevation at its eastern end and its waters join to form the Lochsa River that flows west 67.5 miles to its mouth at about 1,400 feet.

Dynamic, high-energy processes have formed and continue to shape the subbasin. The uplift that formed the mountains accelerated surface erosion and exposed underlying plutonic rocks. Most of the subbasin is underlain by granitic rock of the Idaho batholith. These rocks weather rapidly at the surface to loose, crumbly particles and form sandy soils that are susceptible to erosion and landslides. The streams in the subbasin typically erode their channels along less resistant joints or faults in the rock. The streams appear to incise their channels into these weaker zones and create narrow valleys with very steep valley walls. The Lochsa River channel is relatively straight and has not developed a wide flood plain. Its tributary streams often enter the river as cascades and waterfalls descending the steep valley walls suggesting that the river is exploiting a weaker zone and eroding downward at a faster rate than the smaller tributary streams are able. Numerous geothermal springs in the subbasin suggest a connection to hot rock below.

Climatic extremes occur in the subbasin. The northern, eastern, and southern subbasin boundaries generally have elevations of 6,000 feet or more and snow-dominated weather typical of the northern Rocky Mountains. Average air temperatures are below freezing in winter and approach ninety degrees in the summer months. Annual precipitation is close to forty inches with more than fourteen feet of snow in the head of the subbasin. The western end of the subbasin receives relatively warm and moist Pacific maritime weather. When the warm, moist air from the west meets the cold air of the higher mountains intense storms can develop. Rain from these storms can fall on and melt accumulated snow causing rapid runoff and extreme flood flows.

Large and intense forest fires are known to have swept the subbasin in 1910, 1919, 1924, and 1934 and may have occurred regularly before records were kept. The hot, intense fires strip the area soils of protective vegetation and expose them to erosion. Many burned and eroded areas have not yet been reforested largely because of these fire damaged soils.

The combination of loose soils, steep slopes, and intense rain-on-snow precipitation events produces landslides that dissect the subbasin with steep valleys and periodically deliver sediment to its streams. The subbasin landforms and the historic record confirm that these dynamic, high-energy processes occur repeatedly and define the normal subbasin condition.

The streams in the subbasin are home to Chinook salmon, steelhead, bull trout, rainbow trout, west slope cutthroat trout, mountain whitefish, brook trout, Yellowstone cutthroat trout, golden trout, and many nongame species.

Most of the land in the subbasin is public land owned by the United States and managed by the Clearwater National Forest. Several sections in the headwaters are owned by Plum Creek Timber Company and a few parcels along the lower Lochsa River deeded under the Homestead Act are in private hands.

Twenty-five tributary stream segments were placed on the 1996 303(d) list because of concerns for sediment, and one of those and the Lochsa River were listed for temperature concerns. Idaho has a narrative sediment standard that says sediment concentrations shall not impair beneficial uses, which for these streams are cold water biota and salmonid spawning. Available data show that sedimentation in the subbasin streams is within the normal variability that would be expected here. The twenty-five stream segments in the subbasin were added to the 303(d) list because they did not meet a forest service management goal called a ADesired Future Condition,@ not because their water quality had been shown to fail to support their designated beneficial uses or exceed water quality criteria. The state water quality standards do not incorporate or reference these ADesired Future Conditions@ or the models the forest service uses to measure progress towards these management goals. Forest service model results or evaluations of progress towards a ADesired Future Condition@ should not be used to establish compliance with state water quality standards.

The DEQ investigated the ability of the twenty-five tributary streams= water quality to support their designated beneficial uses through its Beneficial Use Reconnaissance Project and review of fish and other data. This investigation showed that all twenty-five tributaries were supporting their designated beneficial uses.

Idaho has numeric temperature standards intended to protect the cold water biota and salmonid spawning beneficial uses. The DEQ reviewed available habitat, fish, and temperature data for the Lochsa River and concluded that the data show that water temperatures exceeding the criteria are natural during summer and early fall in both the Lochsa River and its tributary streams, that the streams= water quality supports their designated uses despite these exceedances, and that subbasin fish and other aquatic biota are adapted to these naturally high stream temperatures. Based on review of these data, the DEQ recommends that these two subbasin segments be delisted from the 303(d) list of water quality impaired streams.

The recommendations of this subbasin assessment are:

- 1 That water quality information continues to show that state sediment standards are met and the twenty-five stream segments listed on the 1996 303(d) list can remain off the list.

- 2 That the two segments, upper Canyon Creek and the Lochsa River, listed on the 1996 303(d) list as not meeting temperature standards be delisted because the streams are supporting their beneficial uses and the observed temperature exceedences are a regular, natural occurrence in the subbasin and are not caused by the discharge of a pollutant that is suitable for development of a total maximum daily load.
- 3 That the DEQ develop site-specific temperature criteria for the Lochsa River subbasin to allow criteria to agree with the range of naturally high summer and early fall water temperatures reported in the field data. The recommended format includes:
 - a) a narrative criterion stating that water temperatures shall not be altered such that they impair designated uses
 - b) numeric “red flag” temperatures (e.g., 9°C, 13°C, or exceeding a certain percentile value from the period of record, etc.) that would require action or explanation
 - c) identified periods that natural background water temperatures would be lower than “red flag” temperatures
 - d) a requirement that if “red flag” temperatures are exceeded outside of natural background warm periods, the reason for the exceedance be explained, and corrected if it is not caused by natural conditions.
- 4 That management agency and landowner resources in the subbasin continue to be applied to projects to reduce legacy impacts. These activities can continue to enhance water quality in the subbasin.

1.0. SUBBASIN CHARACTERIZATION

The Lochsa subbasin is in the east central region of Idaho (see Figure 1). This section summarizes the physical, biological, and cultural characteristics in the subbasin. Extensive physical and biological data are available for the subbasin because it is almost entirely composed of managed public lands. This summary focuses on those data that are most useful to understanding the subbasin's surface water quality.

1.1. Physical Characteristics

This section summarizes the geology, soils, topography, climate, and hydrology, with emphasis on how these characteristics relate to the parameters of concern, sediment and water temperature, in the subbasin.

1.1.1. Lochsa Area Geology

The Lochsa subbasin is a mature dissected upland forming part of the Clearwater Mountains of the Bitterroot range. Elevations rise from about 1,400 feet at the mouth of the Lochsa River and increase eastward to more than 8,600 feet. Surface geology is represented in Figure 2; a general geologic cross-section of the area is shown in Figure 3.

Upper Jurassic to Cretaceous age plutonic rocks intrude and are bordered by the Precambrian metasedimentary rocks. Intrusive igneous rocks of granitic to granodioritic composition are the dominant lithology; most of these rocks are associated with the Idaho Batholith that underlies most of central Idaho (Alt and Hyndman, 1972). Miocene-age basalt flows and dikes occur in the far southwestern portion of the Lochsa watershed.

The Spruce Creek mylonite zone strikes north-south and dips west and may be the western flank of the Bitterroot dome described by Hyndman (1980). Northeast to north-south trending high angle normal faults are present across the map area. Many of these faults have controlled the emplacement of Eocene dikes and dike swarms (Lewis, et.al., 1992). Day (*in* IDWR, 1980) identified large linear features across the area from high altitude U-2 and satellite photos. These linears are often associated with geothermal springs suggesting that faults or fractures may penetrate to depths where magma has intruded and heats meteoric waters well above the normal geothermal gradient.

The Lochsa River valley has several peculiar geomorphological characteristics. Terraces are scarce and inconspicuous. Long river reaches are almost continuous rapids rather than the alternating pools and rapids common to most other small rivers. Minor tributaries enter the Lochsa River through steep cascades and waterfalls. These characteristics suggest the Lochsa River is rapidly (in geologic time) entrenching its bed (Alt and Hyndman, 1989). The angulate stream pattern suggests joints and/or fault control. Exploitation of more erosive rock on a joint or fault may be one reason for the Lochsa River's incision.

Figure 1. Lochsa subbasin location map

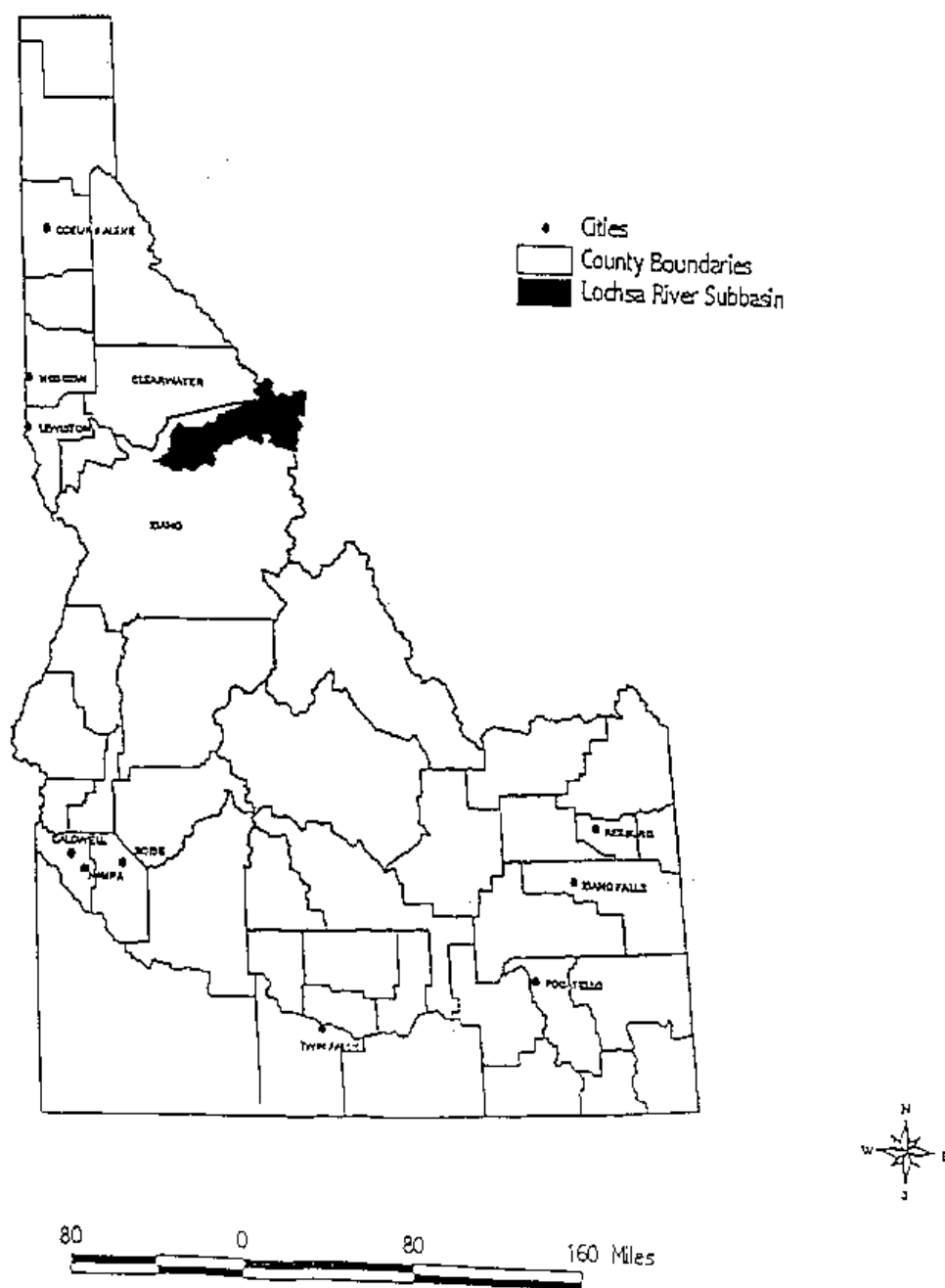


Figure 2. Lochsa River subbasin geologic map

From Bond, et. al (1978) with minor modifications from Lewis, et.al (1992)

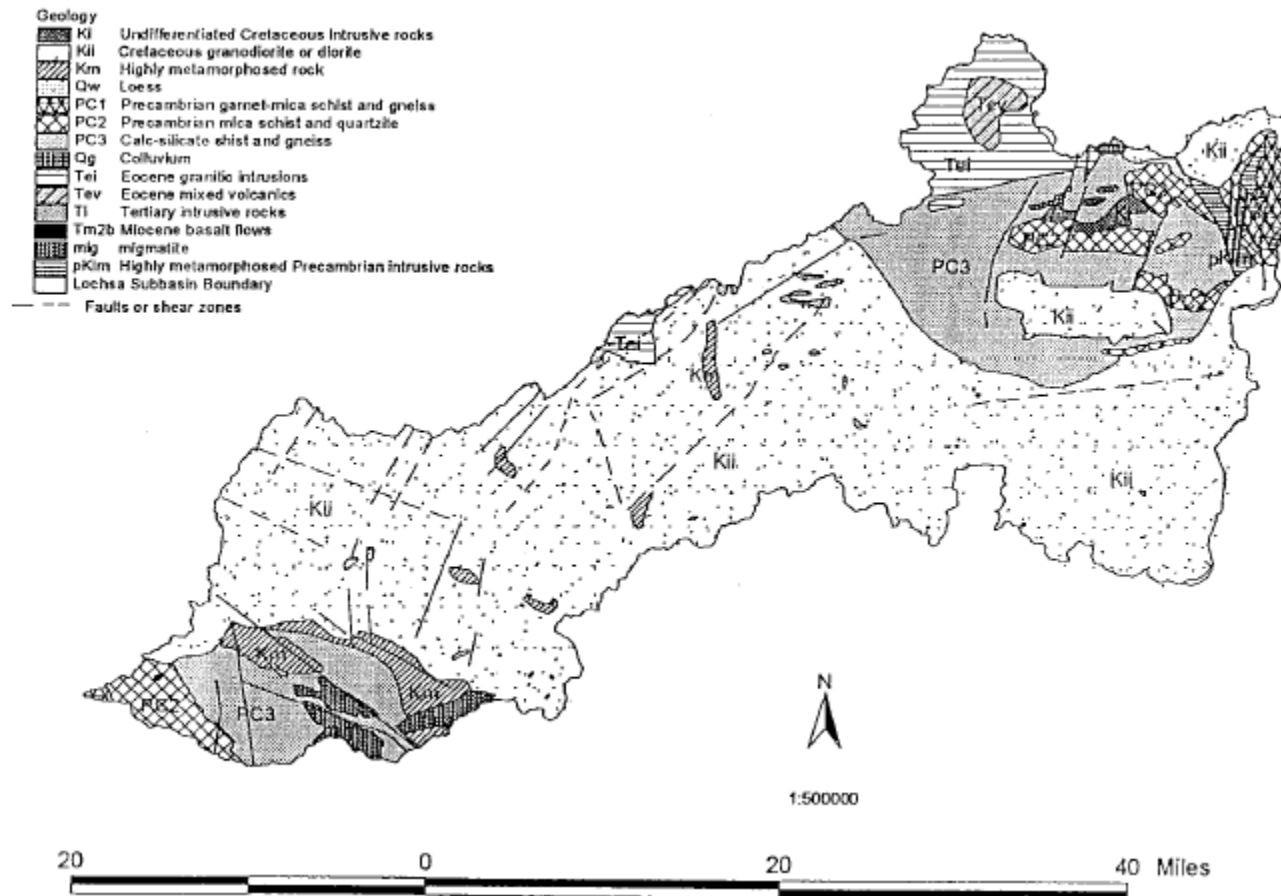
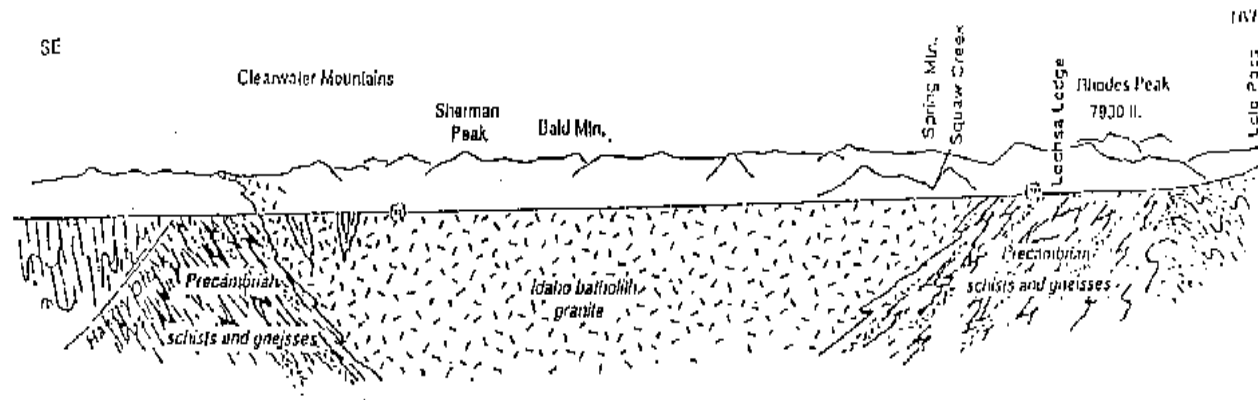


Figure 3. Section drawn along Highway 12 between Lowell and Lolo Pass



Section drawn along Highway 12 between Lowell and Lolo Pass. Broad border zones of metamorphic rocks embrace the granite batholith.

(from Alt and Hyndman, 1989)

1.1.2. Soils

The granodiorite that underlies most of the subbasin weathers rapidly to grus. The soils derived from the grus tend to be sandy, well drained, and cohesionless. The Idaho Department of Lands, US Forest Service soil scientists and specialists from the three northern Idaho National Forests, and the Moscow research station developed erosion hazard and mass failure hazard ratings for the Lochsa subbasin for the Upper Columbia River Basin Environmental Impact Statement (Dechert, 1999). The Clearwater National Forest also completed the North Lochsa Face Landscape and Watershed Assessment in May 1996 that included the lower and middle portions of the subbasin (USFS, 1997).

Approximately 20 percent of the total subbasin acreage is classed as landslide prone. The Forest Practices Cumulative Watershed Effects Process for Idaho assigns a high hazard rating to watersheds containing 25 percent or greater high hazard acreage. Accordingly, 81 percent of the Lochsa subbasin watersheds have a high surface erosion potential and 85 percent have a high mass wasting potential. A measure of the significance of landslides in subbasin stream processes is the fact that 93 percent of the landslide prone area is within 150 feet of streams.

1.1.3. Topography

The subbasin relief is approximately 7,200 feet, rising from about 1,400 feet at the Lochsa River's mouth to more than 8,600 feet along the Bitterroot divide. The southern, eastern, and northern boundaries of the watershed generally have elevations of 6,000 feet or more. During the Pleistocene ice age, alpine glaciation formed cirques and tarns on the sides of the higher Clearwater peaks. Alpine glaciation also created some broad u-shaped valleys and expansive alpine meadows in the upper reaches of Brushy Fork and White Sand Creek drainages. The larger stream valleys were not glaciated. Middle elevations in the Clearwater mountains are characterized by more gentle terrain with broad rounded ridges. Lower elevations display deeply dissected breaklands with high drainage densities and oversteepened slopes.

1.1.4. Climate

General

At lower elevations, along the mainstem Lochsa River, the subbasin climate has mild wet winters and hot dry summers. At elevations above about 4,000 feet, most of the winter precipitation falls as snow. The winter snowpack water content usually peaks in early April and snowmelt contributes much of the summer stream flow. Little precipitation may fall from July through September. For example, in August 1994 near the end of a decade-long drought, no precipitation was recorded at Powell. Summer high temperatures regularly exceed 90 °F and mid-July through August is generally the critical period for stream high temperature.

The official weather reporting station in the Lochsa River subbasin is at Powell at an elevation of 3,409 feet, about one and one-half miles below the Lochsa River headwaters. Daily weather records at Powell begin 1 August 1962. Daily weather observations began downstream in August 1948 at Fenn Ranger Station at an elevation of 1,480 feet, five miles up the Selway from its confluence with the Lochsa. The Fenn station records are used to represent conditions in the lower Lochsa.

Air Temperature

For the period of record, Powell's mean annual temperature has been 42.7 °F as compared with the lower elevation Fenn station's mean of 49.2 °F. Figure 4 shows the average monthly air temperatures at the Powell and Fenn Ranger Stations. Note that the subbasin temperatures range from approximately 15 °F and 23 °F mean January minimums to approximately 82 °F and 88°F mean July maximums at the Powell and Fenn stations respectively.

Hot summers occur regularly in the subbasin and are a major factor influencing stream temperatures. Table 1 summarizes the number of days with high temperatures above 90°F at Powell and Fenn RS over the five years from 1993 to 1997. Powell has averaged about 19 days per year with maximum air temperature above 90°F. The Fenn station has averaged 41 days per year above 90°F. At Powell temperatures more than 90°F occur on about 25 percent of the July and August days. The Fenn station exceeds 90°F on more than 50 percent of the July and August days on average. The average August maximum temperature at Powell has been 82.3 °F. The average Fenn station August maximum temperature averages 88.5°F, with an average low of 50.2°F. At Fenn the average monthly air temperature exceeds Idaho's 13°C (55.4°F) salmonid spawning instantaneous water temperature criterion from May through September.

Table 1. Number of days greater than 90 °F

| Year | Powell | Fenn RS |
|-------------|---------------|----------------|
| 1993 | 3 | 21 |
| 1994 | 33 | 57 |
| 1995 | 1 | 35 |
| 1996 | 13 | 41 |
| 1997 | 3 | 6 |

The long term records provide a datum for measuring warm years and cool years and are useful in putting stream temperature data from a particular year into context. Figure 5 (p. 10) shows annual mean temperatures as the departure from the long term (1895-1997) mean for all reporting stations in Idaho climatic division 4. Climatic division 4 consists of the mountainous region of central Idaho, north of the Snake River plain and south of the Clark Fork River, excluding the valleys and ranges of eastern Idaho. Figure 5 shows that since 1985 every year except 1993 has been warmer than the long term average in this region of Idaho.

Precipitation

Precipitation at Fenn has averaged 38 inches annually, with 53 inches of snowfall. Annual precipitation at Powell averages about an inch more, but with cooler temperatures, snowfall more than triples to 178 inches. Figure 6 shows that the maximum precipitation at both stations occurs during the winter. About 45 percent of the annual precipitation falls as snow at Powell. At the Fenn station, only 14 percent of the annual total comes as snow; even in the winter, most of the precipitation is rain.

Precipitation increases markedly with elevation in the mountains. The Natural Resources and Conservation Service Lolo Pass (elevation 5,235 feet) snow telemetry station (SNOTEL) at the head of the subbasin has averaged more than 50 inches precipitation per year since its 1983 inception (Table 2). Higher peaks to the east and west receive as much as 80 inches per year making them among the wettest of any area in Idaho (NRCS, 1998). The winter snowpack is vital to sustaining summer flows in the subbasin.

The region has experienced an extended drought that has broken only since 1994 (Figure 7a). The October through March precipitation record shown in Figure 7b shows that the drought included less than average snowpack for 16 of 20 recent years. Snowpack data perhaps provide an even better indication of the drought than rainfall at lower elevations, particularly regarding summer stream flow. The 1994 snow water equivalent (yield of water when melted) peaked at 19.6 inches, far below the 1997 peak snow water equivalent of 57.2 inches (see Table 2).

Occasionally mild Pacific air masses meet cold continental air masses producing heavy rainfall combined with rapid snowmelt; this phenomenon is called a rain-on-snow event. These events often occur outside the normal spring snowmelt and trigger mass wasting (e.g., landslides) through soil saturation. Middle elevations, between about 3,000 and 5,000 feet, are most susceptible to rain-on-snow in the subbasin. Two rain-on-snow events occurred recently, one in late November 1995 followed closely by another in early February 1996. Both events caused flooding and landslides in Lochsa tributaries below about 4,000 feet and in the Lochsa River (McClelland and others, 1997). The large No-see-um Creek slide wiped out some of U.S. Highway 12, deposited a large amount of sediment in the Lochsa River, and created a new rapid.

Table 2. Lolo Pass SNOTEL precipitation

| Year | Precip. (inches) | ----- Snow water equivalent ----- | | | | |
|-------------|---------------------|-----------------------------------|-------------|-------------|-------------|--------------|
| | | 1 April | 15 April | 1 May | Peak | Date |
| 83 | 46.5 | -- | -- | -- | -- | -- |
| 84 | 37.8 | 22.6 | 23.1 | 20.3 | 23.3 | 04/14 |
| 85 | 51.4 | 30.2 | 27.5 | 24.8 | 30.5 | 04/08 |
| 86 | 51.7 | 23.5 | 20.0 | 16.8 | 25.1 | 03/19 |
| 87 | 34.0 | 20.6 | 17.5 | 4.4 | 20.8 | 03/31 |
| 88 | 44.4 | 26.2 | 23.1 | 14.2 | 26.7 | 04/07 |
| 89 | 48.5 | 30.2 | 29.7 | 21.6 | 32.2 | 04/07 |
| 90 | 52.0 | 28.7 | 21.6 | 14.8 | 29.2 | 03/20 |
| 91 | 48.2 | 29.0 | 29.1 | 25.5 | 29.3 | 04/12 |
| 92 | 49.5 | 18.2 | 18.0 | 11.4 | 21.4 | 03/02 |
| 93 | 43.3 | 18.8 | 18.7 | 14.8 | 21.3 | 03/23 |
| 94 | 36.8 | 18.4 | 19.3 | 8.5 | 19.6 | 04/10 |
| 95 | 50.1 | 22.3 | 20.8 | 18.1 | 22.3 | 04/01 |
| 96 | 57.9 | 33.9 | 30.9 | 31.0 | 33.9 | 04/05 |
| 97 | 73.5 | 51.7 | 54.2 | 55.7 | 57.2 | 04/24 |
| Mean | 48.4 | 26.7 | 25.3 | 20.1 | 28.1 | 04/02 |

The climatic variables discussed above, air temperature, precipitation as rain and snow, and weather patterns and timing, are important natural controls of stream temperature in the Lochsa subbasin. They are also a component of the generation of periodic landslides, which are a natural source of sediment for streams in the subbasin.

Figure 4. Air Temperature at a) Powell and b) Fenn RS, Idaho

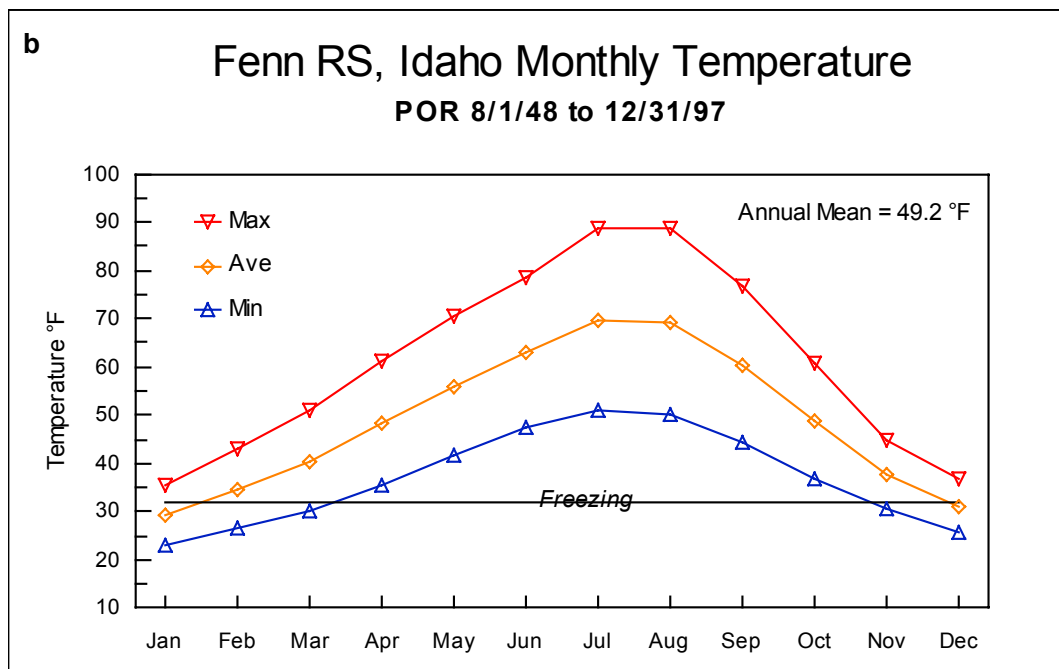
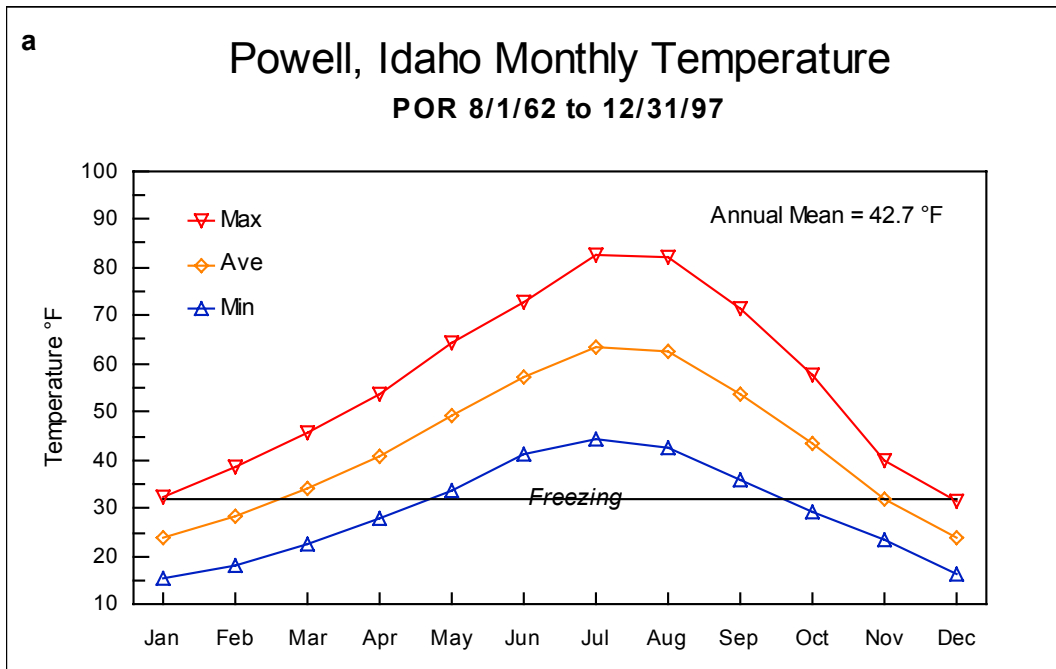


Figure 5. Long term temperature means a) annual and b) July/Aug

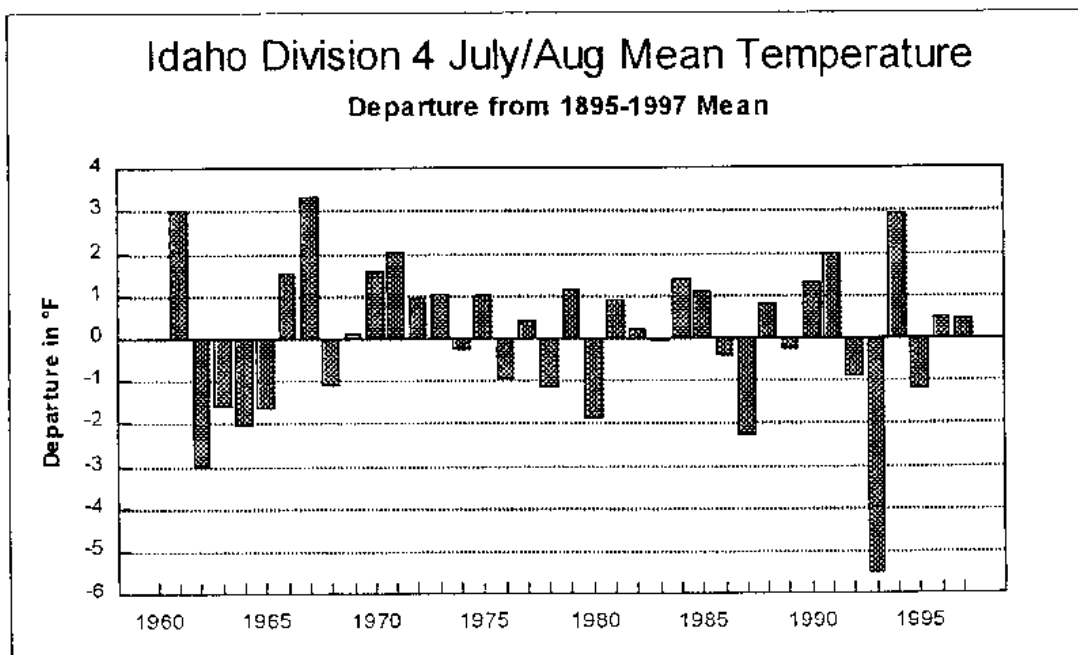
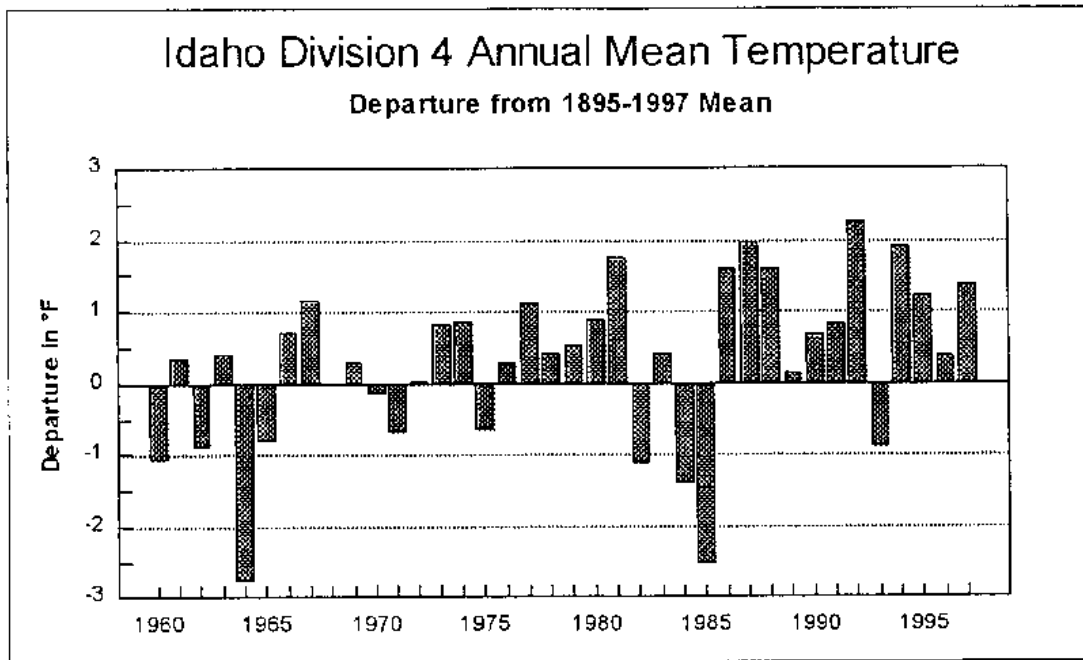


Figure 6. Precipitation by month at a) Powell and b) Fenn RS, Idaho

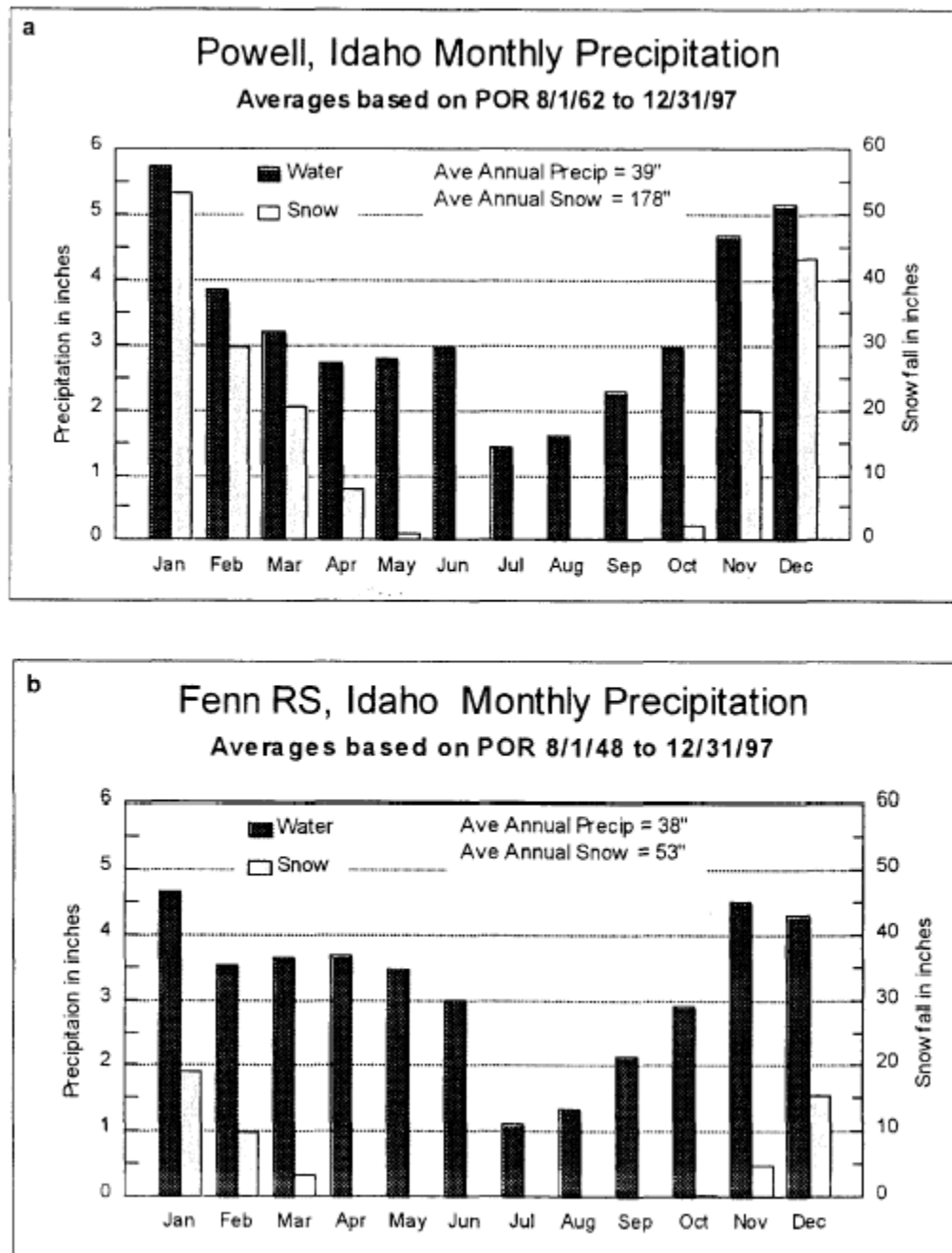
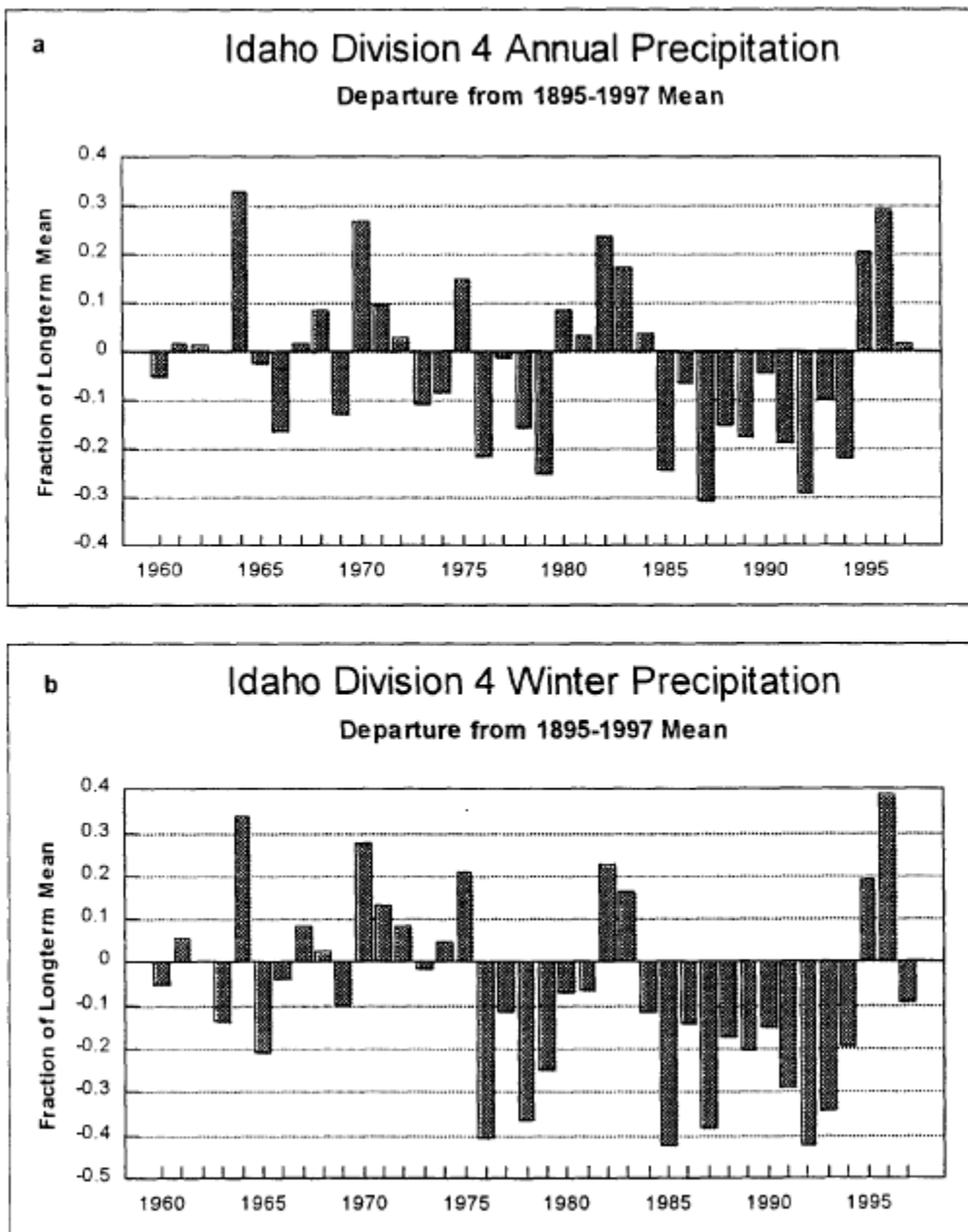


Figure 7. Long term precipitation means, a) annual and b) winter seasons



1.1.5. Hydrology

The Lochsa River is an eighth order stream, draining 1,180 square miles. Figure 8 shows the Lochsa subbasin, the river, and major tributary streams. The Lochsa River flows almost 68 miles from its headwaters at the confluence of White Sand and Crooked Fork Creeks at more than 3,500 feet elevation to its mouth at Lowell at more than 1,400 feet. The Lochsa River was designated as a “recreational river” when the Wild and Scenic Rivers Act passed in 1968.

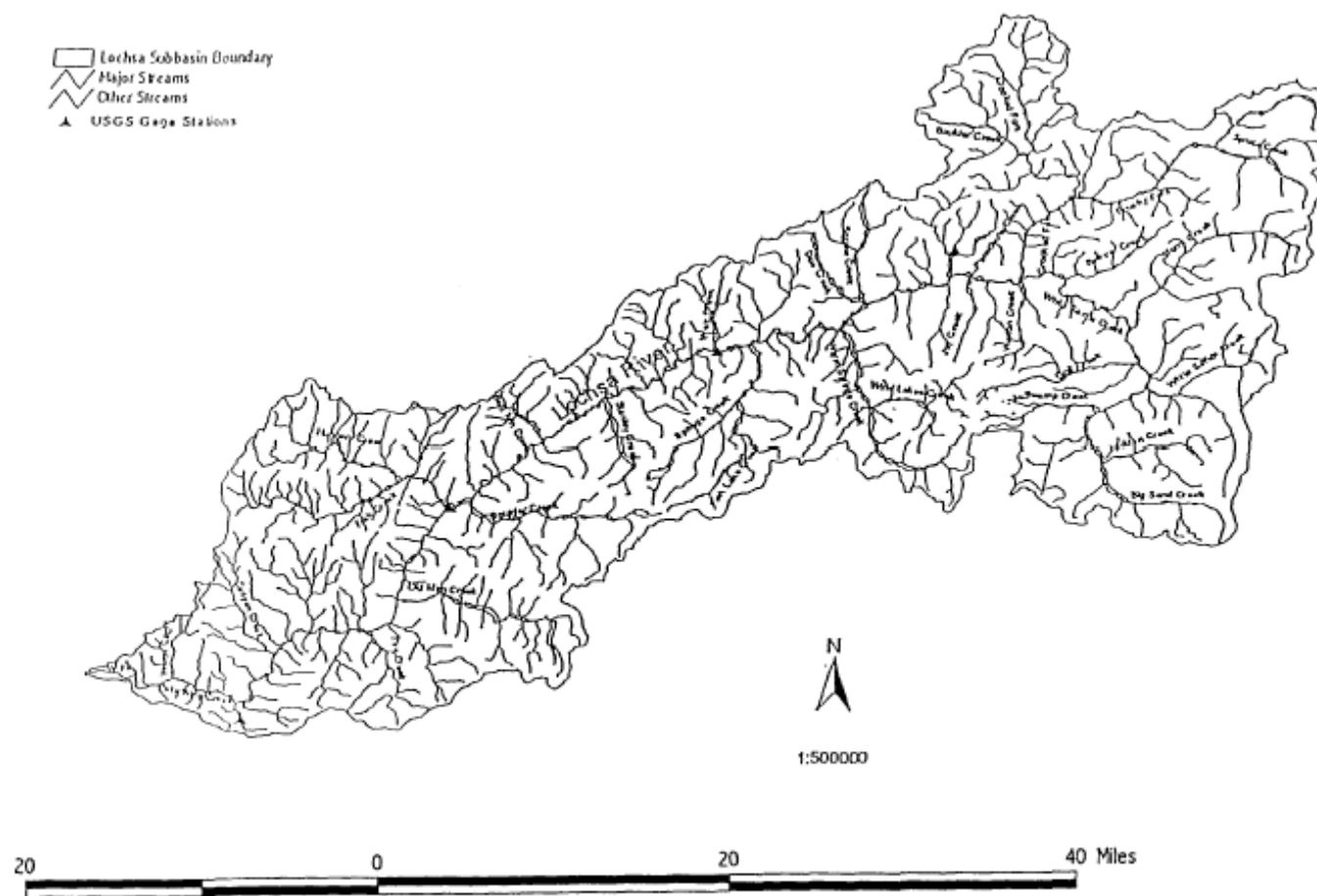
The USGS calculates the Lochsa River annual mean flow for the period of record at its Lowell station as 2,855 cfs. The annual seven-day minimum discharge for 1997 was 387 cfs and the annual seven-day minimum discharge for the period of record, measured in 1952, is 156 cfs (Brennan, et.al., 1997). Its peak discharge of 35,100 cfs occurred on 8 June 1964. Peak flows occurred between 18 April and 17 June during the period of record, with 23 May as the median date for peak flow.

The timing of the peak has varied. Figure 9 displays the dates of peak discharge from 1935 through 1997. As the record progresses, peak flows come early, then after 23 May, and in recent years are coming earlier again. The peak flow occurred before 23 May during the first third of the record about 64 percent of the years, during the second third about 27 percent, and in the last third about 57 percent.

One hypothesis to explain these observations is that the forest practices used during the 1951 to 1974 period may have caused peaks to occur later than during the previous, unmanaged, period. If this is true, the shift to an earlier peak from 1975 to 1995 suggests a return to conditions more like the undisturbed condition. Another, perhaps simpler, hypothesis is that variation in Division 4 monthly mean temperature for these periods explains the observed changes in peak timing. Table 3 shows that the Division 4 1951 to 1974 monthly mean spring temperatures are lower than the preceding and following periods. Cooler spring weather may explain the later peaks during 1951 to 1974.

Thirteen geothermal springs are known to occur in Idaho County. They range from 41 to 59⁰ C, are distributed over a large area, and are not limited to one locality or rock type. Most geothermal springs issue from granitic rocks or a granitic contact, and all are associated with known faults or linear features (Idaho Department of Water Resources, 1980). The igneous and metamorphic rocks that underlie the entire subbasin can be assumed to have secondary permeability, i.e., fracture permeability, for ground water flow. Table 4 lists characteristics of five geothermal springs associated with a subbasin lineament for which these data are available, the first four being on or near the Lochsa River (Idaho Department of Water Resources, 1980). Based on: 1) the observed lineation

Figure 8. Lochsa subbasin hydrologic map



in the subbasin that may be associated with faulting or fracturing, 2) the assumption that ground water must flow via fracture permeability, and 3) the string of geothermal springs along the lineation, assuming that there is a geothermal component to stream baseflow in the subbasin (besides these surface discharges) is reasonable.

Figure 9. Timing of discharge peaks from 1935-1997

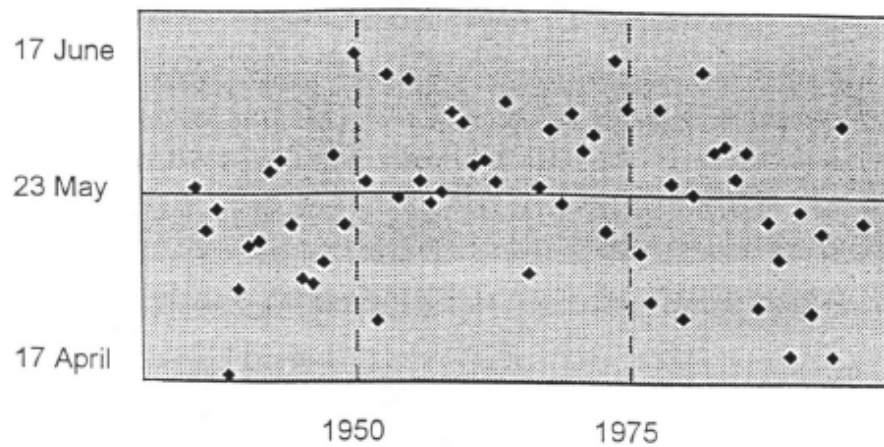


Table 3. Unit 4 monthly mean temperatures in degrees Fahrenheit (°F)

| Period | March | April | May |
|-----------|-------|-------|------|
| 1935-1950 | 31.6 | 41.0 | 49.8 |
| 1951-1974 | 30.3 | 39.3 | 48.8 |
| 1975-1995 | 34.8 | 42.5 | 50.0 |

Table 4. Characteristics of geothermal springs along the Lochsa River

| Name | Rock Type | Temp. (°C) | Discharge (gpm) | No. of Vents |
|----------------------|-----------|------------|-----------------|--------------|
| Colgate Licks | Granitic | 45 | 189 | several |
| Jerry Johnson | Granitic | 48 | 1,135 | 8 |
| Little Jerry Johnson | Granitic | 41 | No data | 2 |
| Weir Creek | Granitic | 47 | 227 | 6 |
| Stanley | Granitic | 49 | 113 | 2 |

Additional information about stream characteristics of 303(d) listed streams in the subbasin is in Section 4.0 below.

1.2. Biological Characteristics

This section summarizes the typical terrestrial vegetation and aquatic life in the subbasin.

1.2.1. Terrestrial Vegetation

The subbasin is dominated by coniferous forest vegetation. Western red cedar, Douglas-fir, and grand fir are common tree species. Alder, cottonwoods, and mixed forbes and shrubs have reforested some areas subjected to severe forest fires.

Forest fires have affected the distribution and types of vegetation. For example, forest fire history records show that large fires in 1910, 1919, 1924, and 1934 burned 61 percent of the 128,000 acre area sometimes called the “north Lochsa face.” Because some drainages burned two to three times between 1910 and 1934, forest succession there has been retarded and seral shrub fields still replace trees (USDA, 1997). The forest service estimates that approximately 49 percent of the entire subbasin has been burned since the 1910 fire (Jones and Murphy, 1999).

1.2.2. Aquatic Life

The following game fish may be found in the subbasin.

| <u>Common Name</u> | <u>Taxonomic Nomenclature</u> |
|-----------------------|---------------------------------------|
| brook trout | <i>(Salvelinus fontinalis)</i> |
| bull trout | <i>(Salvelinus confluentus)</i> |
| chinook salmon | <i>(Oncorhynchus tshawytscha)</i> |
| golden trout | <i>(Oncorhynchus aguabonita)</i> |
| mountain whitefish | <i>(Prosopium williamsoni)</i> |
| rainbow trout | <i>(Oncorhynchus mykiss)</i> |
| steelhead | <i>(Oncorhynchus mykiss)</i> |
| westslope cutthroat | <i>(Oncorhynchus clarki lewisi)</i> |
| Yellowstone cutthroat | <i>(Oncorhynchus clarki bouvieri)</i> |

The following non-game fish species may be found in the subbasin.

| <u>Common Name</u> | <u>Taxonomic Nomenclature</u> |
|--------------------|----------------------------------|
| mottled sculpin | <i>(Cottus bairdi)</i> |
| Paiute sculpin | <i>Cottus beldingi)</i> |
| shorthead sculpin | <i>(Cottus confusus)</i> |
| torrent sculpin | <i>(Cottus rhotheus)</i> |
| redside shiner | <i>(Richardsonius balteatus)</i> |

| | |
|-------------------|----------------------------------|
| longnose dace | <i>(Rhinichthys cataractae)</i> |
| speckled dace | <i>(Rhinichthys osculus)</i> |
| largescale sucker | <i>(Catostomus macrocheilus)</i> |
| bridgelip sucker | <i>(Catostomus columbianus)</i> |
| Pacific lamprey | <i>(Entosphenus tridentatus)</i> |

More detailed summaries of fish species present during instream sampling events in the subbasin are presented later in Section 3.3. in Table 10 and in Section 4.0.

Several varieties of herptofauna are known or suspected to inhabit the subbasin including, the long toed salamander, Coeur d'Alene salamander, Idaho giant salamander, tiger salamander, garter snake, western toad, Pacific chorus frog, bull frog, and tailed frog (Clearwater Basin Bull Trout Technical Advisory Team, 1998).

The macroinvertebrate assemblage includes Ephemeroptera, Plectoptera, Trichoptera, Coleoptera, and Diptera. The 1996 Beneficial Use Reconnaissance Project data suggest that most of the macroinvertebrates sampled basin-wide are Ephemeroptera, Plectoptera and Trichoptera (DEQ, 1996). These genera are generally indicators of good water quality.

1.3. Cultural Characteristics

This section describes present land ownership and principal land uses in the subbasin.

1.3.1. Land Ownership

| | |
|---|---------|
| Total subbasin acreage | 768,300 |
| United States lands managed by USFS | 712,800 |
| Plum Creek Timber Company, Ltd. | 40,261 |
| Other holdings (private, US Highway 12, recreational river corridor) | 5,239 |

Treaties reserved to tribes' access to lands outside reservation boundaries for activities such as hunting, fishing, and gathering in "usual and accustomed" places.

1.3.2. Land Use

Large scale commercial logging managed by the USFS started in the subbasin in 1953. From then to the present 5.9 percent of the timber in the subbasin has been harvested (Jones, 1999). Roads were built for access to timber beginning that year. Logging still plays an important role in the economies of the communities surrounding the subbasin (USDA Forest Service, 1999) (Idaho Department of Commerce, 1997). In 1962, U.S. Highway 12 was completed, connecting Lewiston with Missoula and providing all weather access for timber harvesting and recreational activities.

Besides timber, other resource commodities that support commercial activity are, firewood, berries, minerals, and wildlife. Recreational activities include fishing, kayaking, canoeing, rafting, swimming, hunting, camping, mountain biking, wildlife and scenery viewing, winter sports, motorcycling, and hiking and driving the historic trail systems.

The Lolo trail system attracts visitors who are interested in its prehistoric and historic trails. The trail known to the Nez Perce as “Kushahna Ishkit,” the buffalo trail, is potentially thousands of years old. The Lolo Motorway generally follows the Nez Perce “Nee-Me-Poo” trail, which was used by the Nez Perce in their 1877 flight from their homelands eastward into Montana. Lewis and Clark’s trail through the region is marked. The USFS (Jones, 1999) reports that 1,421 miles of roads cross 1,180 square miles in the subbasin, yielding an average road density of 1.2 road miles per square mile (about 0.6% of the subbasin area assuming an average 28-foot width).

The 1964 Wilderness Act identified much of the subbasin south of the Lochsa River as suitable primarily for non-motorized recreational activities. The subbasin acreages not considered suitable for general development are summarized as follows.

| | <u>Acres</u> |
|---|---|
| Total subbasin | 768,300 |
| Lands not suitable for logging: | |
| USFS-managed lands not suitable for logging | 210,600 |
| Designated wilderness area | 62,500 |
| Other (private, U.S. Hwy 12, recreational river corridor) | 15,239 |
| Plum Creek Timber Company | <u>2,214</u> |
| Total not suitable for logging | 490,553 |
| Percent of subbasin not suitable for logging = | $\frac{490,553}{768,300} \times 100 = 63.8\%$ |

These lands are now used mainly for nonmotorized recreational activities. The area’s wilderness and Wild and Scenic River designations may attract recreationists. For example, from 1987 to 1996, the clientele of permitted floating outfitters has increased 558 percent with a commensurate increase from 450 to 2,957 service days (Mitchell, 1999).

2.0. WATER QUALITY CONCERNS

This section discusses the reasons that stream segments were placed on the 303(d) list, describes the applicable water quality standards, identifies potential sources of surface water pollutants, and describes past and present pollution control efforts.

2.1. Water Quality Limited Segments

Lochsa River Tributaries

The twenty-five tributary segments on the 1996 303(d) list occur in eleven tributary basins. Twenty-four of the tributaries were listed as not meeting state sediment standards and one tributary was listed as not meeting state sediment or temperature standards. In each case, the basis for listing the stream as not meeting Idaho sediment criteria was because USFS modeling had estimated that the basin's sediment production exceeded forest standards or that another USFS sedimentation indicator, like cobble embeddedness, exceeded a USFS "Desired Future Condition." The Idaho sediment criterion requires that sediment quantities not impair designated beneficial uses, which for cold water biota is *protection and maintenance of viable communities of aquatic organisms and populations of significant aquatic species which have optimal growing temperatures below eighteen (18) degrees C* and for salmonid spawning is *providing a habitat for active self-propagating populations of salmonid fishes*.

Lochsa River

The Lochsa River was listed as not meeting state temperature standards.

2.2. Applicable Water Quality Standards

The state sediment and temperature standards relevant to the 303(d) listings in the subbasin are summarized below.

The Idaho surface water use classification (IDAPA 16.01.02.100.02) for aquatic life includes

a) cold water biota: waters which are suitable or intended to be made suitable for protection and maintenance of viable communities of aquatic organisms and populations of significant aquatic species which have optimal growing temperatures below eighteen (18) degrees C.

and

c) salmonid spawning: waters which provide or could provide a habitat for active self-propagating populations of salmonid fishes.

The Idaho general surface water quality criterion for sediment (IDAPA 16.01.02.200.08) is

Sediment shall not exceed quantities specified in Section 250, or, in the absence of specific sediment criteria, quantities which impair designated beneficial uses. Determinations of impairment shall be based on water quality monitoring and surveillance and the information utilized as described in Subsection 350.02.b. [Subsection 350.02.b. describes nonpoint source restrictions when water quality criteria are not being met, but does not add any specific sediment criteria.]

The Idaho general surface water quality criteria for temperature are:

for cold water biota (IDAPA 16.01.02.250.02.c.ii.), Water temperatures of twenty-two(22) degrees C or less with a maximum daily average of no greater than nineteen (19) degrees C., and for salmonid spawning (IDAPA 16.01.02.250.02.d.ii.), Water temperatures of thirteen (13) degrees C or less with a maximum daily average no greater than nine (9) degrees C., and for bull trout (IDAPA 16.01.02.250.02.e.), Water temperatures for the waters identified under Section 250.02.e.i. shall not exceed twelve degrees Celsius (12⁰C) daily average during June, July and August for juvenile bull trout rearing, and nine degrees Celsius (9⁰) daily average during September and October for bull trout spawning. For the purposes of measuring these criteria, the daily average shall be generated from a recording device with a minimum of six (6) evenly spaced measurements in a twenty-four (24) hour period, and (IDAPA 16.01.02.250.02.e.ii.) Exceeding the bull trout temperature criteria will not be considered a water quality standards violation when the air temperature exceeds the ninetieth (90th) percentile of the seven (7) day average daily maximum air temperatures for the warmest seven (7) day period of the year, and EPA has promulgated a Bull Trout Temperature Criterion for Idaho water bodies it has listed as protected for bull trout spawning and rearing. EPA's criterion supersedes the state bull trout temperature criterion for those waters to which it applies (EPA, 1997).

2.3. Pollutant Source Inventory

This section lists potential sources of surface water pollutants in the subbasin. The pollutants cited as causing exceedance of water quality standards in the 303(d) listing of subbasin streams are discussed in detail. The section also discusses where additional data can help clarify questions about pollution and maintenance of state water quality standards in the subbasin.

2.3.1 Lochsa Subbasin Pollutant Source Inventory

Pollutant sources may occur as point sources, those for which effluent limitations may be required under sections 301(b)(1)(A) and 301(b)(1)(B) or nonpoint sources of pollutants that are not subject to effluent limitations.

Point sources of pollutants are unknown within the Lochsa subbasin.

Nonpoint pollution sources that can affect sediment discharges in the Lochsa subbasin include forest management and forest road activities, the community of Lowell, recreational activities, mining, livestock grazing, landslides, and US Highway 12. U.S. Highway 12 and geothermal surface and ground water discharges may contribute thermal loads to the streams. Decreased stream side vegetation from forest management activities and forest fires may have reduced shade on some stream reaches and allowed additional thermal loading. The precise pollutant contributions from each of these nonpoint sources to the subbasin are unknown.

The Clearwater National Forest and private timber companies conduct forest management activities including road building, timber thinning and harvesting, fertilizing, and fire suppression that may result in increased erosion and sedimentation. The private timber lands are mostly in a checkerboard pattern in the upper Lochsa River, and Brushy Fork, Papoose, Crooked Fork, White Sand, and Walton Creek watersheds. The remainder of the timber-producing land is managed by the USFS.

Lowell would be expected to produce a small, localized increase in storm water discharge because of the increased low permeability surface areas of pavement, hard-packed dirt surfaces, and building roofs.

Recreational activities in the subbasin may contribute to erosion and sedimentation. They include picnicking, hiking, camping, hunting, horseback riding, bicycling, off-road vehicle use, fishing, kayaking, canoeing, rafting, swimming, cross country skiing, snowmobiling, and scenery and wildlife viewing.

Stone, sand, and gravel are mined for local road construction and surfacing at several sites within the subbasin, usually away from riparian areas and streams. Limited placer mining for precious metals and gemstones is conducted at several locations.

Grazing activities that may contribute to riparian area denudation and the sediment load within the subbasin are relatively few. They include short-term, site specific grazing of pack and saddle stock and minor domestic livestock grazing that occurs mostly on private lands in the lower part of the subbasin. Plum Creek Timber Company, the private landowner in the upper part of the subbasin, does not have grazing leases there.

Landslides are important sedimentary processes in the subbasin. The combination of readily weathering granitic rocks that yield non-cohesive soils on steep slopes, fire-damaged soils that have not been able to reforest, and warm Pacific air masses flowing up the valley that can cause rain on snow events, can result in significant landslides. Forest management activities have been shown to increase the numbers of landslides. Most recently, 907 landslides were documented in the winter of 1995 and 1996 in the Clearwater National Forest (not all of these were within the subbasin). The USFS determined that about two-thirds of these were related to management activities and about one-third were natural: 58 percent were road-related, 12 percent were associated

with timber harvest, and 29 percent were natural. These findings are similar to those for the last major landslide event in 1974, which was also triggered by rain on snow, but the more recent event is estimated to have produced twice the sediment volume. Total sediment volume, rather than number of slides, may be more relevant to water quality. The best available data estimate that the sediment volume delivered to streams was apportioned as follows: 25% from roads, 4% from timber harvest areas, and 71% from natural landslides. For example, two of the 907 landslides resulting from the 1995-1996 rain-on-snow events produced 38 percent of the sediment volume delivered to streams. One of these two landslides, the No-see-um Creek debris flow, occurred in the subbasin. The No-see-um Creek watershed is unroaded and unmanaged. This natural landslide transported approximately 100,000 cubic yards of sediment into the Lochsa River. That volume is 25 percent of the estimated volume delivered to streams from all 907 landslides in the Clearwater National Forest in 1995-1996 (McClelland, et al., 1997).

U.S. Highway 12 follows the Lochsa River from its mouth at Lowell to its headwater tributaries. The highway is maintained by the Idaho Department of Transportation. The highway can be a source of sediment from winter road sanding, maintenance construction, small landslides associated with cut and fill slopes, and intrusions into flood-prone areas of the river. The Idaho Department of Transportation reported that the volume of road sanding material applied in the subbasin from 1992 to 1996 ranged from 8,900 to 21,200 cubic yards per year. The temperature of storm water discharges may increase because of contact with warm pavement.

2.3.2. Lochsa River Subbasin Pollutant Source Data Gaps

Information that identifies the magnitude and location of geothermal load sources via ground water discharges is unknown, and the available data are not believed to identify the total component of the surface geothermal discharges to subbasin streams.

The extent to which riparian timber harvest has altered stream side shading on tributary streams is not known. No timber harvest is known on the left (generally southern) bank of the Lochsa River that could provide stream side shade, but timber clearing along the right (generally northern) bank in the Highway 12 corridor could have minimally reduced shading.

Invasive, non-native plant species, such as spotted knapweed, may affect soil and water conservation. The effect on water quality of nonnative plants is unknown.

2.4. Summary of Pollution Control Efforts

This section describes some past and present pollution control efforts in surface waters in the subbasin. Its scope is limited to those efforts that could control sediment and temperature, the parameters of concern identified in the 1996 303(d) list.

2.4.1. Past Pollution Control Efforts

The Idaho Forest Practices Act was codified during the mid-1970s to comply with Section 208 of the federal Clean Water Act. The Forest Practices Water Quality Management Plan identifies the Rules and Regulations Pertaining to the Idaho Forest Practices Act as best management practices (BMPs) to be used during forest practices, e.g., logging, to protect surface water quality. Espinosa *et al.*(1997) describe estimated sediment delivery above USFS management plan goals from the 1950s through the 1970s, but noted, “*The awareness of watershed and habitat degradation problems helped to initiate a moderation of timber and road construction impacts in the early 1980s.*” The USFS has been working with the Nez Perce tribe to obliterate 76.4 miles of unused and old, poorly constructed and maintained roads since 1997 (Jones and Murphy, 1999). All of the 5.1 percent of the subbasin riparian area that was at least partially subjected to timber harvest has been replanted (Jones, 1999). On-site audits of project compliance with the Forest Practices Act were conducted in 1978, 1984, 1988, 1992 and 1997. Because of these audits, BMPs have been revised to promote better water quality protection (Idaho Department of Health and Welfare, 1993) (USFS, 1998).

2.4.2. Present Pollution Control Efforts

Erosion and sedimentation control has been the subject of many recent efforts in the subbasin. Fisheries improvement projects that included riparian zone rehabilitation have been conducted jointly by the Nez Perce tribe and the USFS. The USFS has an ongoing program to control pollution associated with forest practices. Fire prevention, suppression, and management activities are conducted by the forest service in ways developed to minimize water pollution.

In 1997 the USFS completed a study of the 1995-1996 subbasin landslides and made recommendations to reduce slides associated with forest management. One management directive that resulted from these recommendations was a project to identify and either abandon or obliterate roads with high failure risk. The project goal is to obliterate 100 miles of road per year in the Clearwater National Forest (USDA Forest Service, CNF briefing paper, 1999). This USFS and Nez Perce tribe joint project continues to obliterate (22 miles subbasin miles as of September 1999) old, unused roads and roads that are in danger of failing and damaging streams.

Very little road construction is occurring in the subbasin (Jones and Murphy, 1999.) Timber harvest is no longer occurring in riparian areas on forest service managed lands (Jones, 1999). An interagency agreement has created minimum stream buffer zones for protection of anadromous (PACFISH) and inland (INFISH) fish species. These measures, that are more restrictive than those in the Idaho Forest Practices Act, are being used by the forest service in the subbasin. The USFS audits implementation of the Forest Practices Act: in 1998, it canceled the Brushy Creek timber sale contract because the purchaser was not meeting the best management practice requirements for stream protection. Additionally, these practices are audited every four years by an interagency

team. Sections 3.1. and 4.0 document how these efforts have kept sediment loads to subbasin streams in compliance with the Idaho water quality standards.

The USFS has had an active temperature monitoring program in the subbasin since 1990. In 1997 it monitored stream temperature at 60 sites on 47 subbasin streams. The thermograph data have shown that “...*temperatures exceeding the desired rearing temperature criteria by several degrees were maintained for extended periods of time...* (USFS, 1998).” Historic data presented below in section 3.1. and current knowledge of stream heating processes indicate these conditions are natural and regular occurrences in the subbasin.

3.0. WATER QUALITY STATUS

This section presents and discusses various data used to evaluate water quality status compared with the state sediment and temperature criteria. Sediment transport, instream temperature, biologic assessment, fish data, and data gaps are discussed. A brief discussion here about how these streams were listed as water quality limited because of sediment will help the reader understand the conclusions and recommendations presented later.

The twenty-five stream segments in the subbasin were added to the 303(d) list because they did not meet a forest service management goal called a “Desired Future Condition,” not because they had been shown to fail to support their designated beneficial uses or exceed water quality criteria. Idaho’s water quality standards do not incorporate or reference these “Desired Future Conditions” or the models the forest service uses to measure progress towards these management goals. Forest service model results or evaluations of progress towards a “Desired Future Condition” should not be used to establish compliance with state water quality standards.

The USFS reviews and revises the processes it uses to set its “Desired Future Conditions.” In a recent review the forest service noted that, *“The worst case condition is always used...Actual conditions may therefore be better than presented.”* The process can result in a low classification because of natural conditions in a watershed, not only because of management disturbances. Recently the forest service reported that, *“Inherent characteristics, such as geology and stream size or energy play a very large role in determining instream levels of sediment...some of the streams in the roaded watersheds are classed ‘moderate’ for inherent reasons only...”* and *“...cobble embeddedness can often exceed Desired Future Condition in undisturbed watersheds due to sensitive landforms and parent materials.”* The forest service has recognized these problems and has stated, *“We have not adequately developed the methodology to separate out the inherent vs. anthropogenic levels of sediment in the roaded watersheds”* and *“In the future, the Forest Plan standard will be set to reflect these inherent stream capabilities (USFS, 1997).”*

“Desired Future Conditions” are part of a management process including internal USFS goals, objectives, and standards toward which forest management decisions are driven. The Clearwater National Forest’s monitoring data show that improved forest practices have contributed to improved water quality in the subbasin. However, these “Desired Future Conditions” do not correspond to the state water quality sediment criterion that is based on support of beneficial uses. In its official opinion describing the relationship of fisheries’ “Desired Future Conditions” to the Forest Plan, the USFS referred to the Forest Plan management goals to *“Manage watersheds, soil resources, and streams to maintain high quality water that meets or exceeds State and Federal water quality standards...”* The forest service goes on to clarify that, *“These DFCs are appropriate, provided they are not used as a standard that must be achieved (USDA Forest Service, 1994).”*

“Desired Future Conditions” are a forest service management tool that may set internal goals, objectives, and standards different from state and federal water quality standards, but they are not the state water quality standards approved under the Clean Water Act.

3.1. Water Column Data

In 1997, the Clearwater National Forest analyzed 2,700 suspended sediment and 20 bedload samples. The USFS presently monitors only suspended sediment in the subbasin. Table 5 summarizes these data for the subbasin, which are for suspended sediment only.

The USFS monitored bedload in 16 of the 25 tributary stream segments listed on the 1996 303(d) list as not meeting the state sediment criterion. Most of the sampling in the listed streams was done in the 1980s. The periods of record for these sampling efforts ranged from one year lows to a high, from Pete King Creek, of 20 years. The USFS concludes from these data that bedload comprises five to ten percent of the total sediment load in the subbasin and that the bedload is mostly sand-sized particles in all subbasin tributary streams.

The sediment monitoring data in Table 5 show that the average suspended sediment concentrations in all streams for the period of record are low. These sediment monitoring data are consistent with the findings of Idaho’s Beneficial Use Reconnaissance Project, further described in Sections 3.2. and 4.0., that confirmed that the stream’s beneficial uses are being met and Idaho’s narrative sediment criterion is not being exceeded.

Table 5. Summary of USFS discharge and suspended sediment data for Lochsa subbasin

| Creek | Period of Record | Average Discharge & Suspended Sediment through 1996 | | 1997 Discharge & Suspended Sediment | |
|------------|------------------|---|--------|-------------------------------------|--------|
| | | (cfs) | (mg/L) | (cfs) | (mg/L) |
| Canyon | 92-97 | 36.8 | 11.0 | 92.5 | 34.1 |
| Deadman | 80-97 | 44.0 | 7.6 | 62.1 | 23.1 |
| Fish | 92-97 | 206 | 5.9 | 333 | 82.2 |
| Papoose | 96-97 | 134 | 5.8 | 68.6 | 110.9 |
| WF Papoose | 96-97 | 85.0 | 1.2 | 31.5 | 4.4 |
| Pete King | 76-97 | 45.5 | 32.7 | 58.5 | 52.1 |
| Squaw | 89-91, 95-97 | 40.6 | 5.7 | 98.8 | 28.9 |
| WF Squaw | 96-97 | 17.0 | 3.3 | 16.4 | 3.9 |
| Walton | 92-97 | not measured | 5.7 | not measured | 3.5 |

The 1997 data show suspended sediment concentrations were above average for the period of record for all but Walton Creek, but discharges were also 29 to 151 percent above average for all streams with a period of record of five or more years. The USFS's four Clearwater National Forest precipitation gauging stations received record precipitation in 1997 (the second consecutive record year) ranging from 151 to 156 percent of normal (USFS, 1998).

Additionally, the landslides discussed in Section 2.3.1. occurred throughout the subbasin during the 1995-1996 winter and provided fresh sediment to the streams. The 1996 and 1997 record setting precipitations combined with the sediment from the 1995-1996 landslide activity explain the rise in suspended sediment concentrations in the subbasin in 1997. This sediment pulse is expected to subside, as happened following the 1974, 1975, and 1976 period, and sediment concentrations will approach the average concentrations with the return of more normal climatic conditions.

Baseline stream temperature data are available for the Lochsa River and several tributary streams in the subbasin. The temperature data presented in Table 6 below for the period 1956 through 1959 are extracted from a Department of Fish and Game report (Department of Fish and Game, 1962). Monthly maximum and mean water temperature data are shown. These data are important because they record stream temperature before the opening of U.S. Highway 12 in 1962, when access to the subbasin was less than now. The data are presented in downstream order of monitoring stations, i.e., the Lochsa River immediately upstream of Warm Springs Creek, Warm Springs Creek above Jerry Johnson Hot Springs (about 1.0 mile upstream from the mouth), the mouth of Warm Springs Creek, the mouth of Fish Creek, and the Lochsa River about 0.7 miles above Lowell.

The data show that, for June through October of these years, stream temperatures in the subbasin regularly exceeded standards, yet the streams were supporting beneficial uses. Column three in Table 7 below summarizes the percent of the measurements that exceed these criteria's temperatures.

Table 6. 1956 to 1959 Lochsa subbasin stream temperature data

| Stream | June max/mean | July max/mean | August max/mean | September max/mean | October max/mean |
|----------------------------------|------------------|------------------|--------------------|-----------------------|---------------------|
| 1956 | | | | | |
| Lochsa above Lowell | ----- | 78*/70.5* | 75*/69* | 67/61 | 58/51.5 |
| 1957 | | | | | |
| Warm Springs above Jerry Johnson | 53/45 | 62/56 | 61/56.5 | 58/52 | 53/43 |
| Warm Springs at mouth | 54/45 | 63/56 | 65/58 | 62/54.5 | 58/46 |
| Fish at mouth | ----- | ----- | ----- | 61/55.5 | 59/46 |
| Lochsa above Lowell | 60/52 | 76*66* | 74.5/67.5* | 68.60 | 62/49 |
| 1958 | | | | | |
| Lochsa above Warm Springs | 66/54.5 | 68/61 | 71*/58.5 | 64/50.5 | 34/33 |
| Warm Springs above Jerry Johnson | 56/46.5 | 62/55.5 | 65/59 | 57/49.5 | 46/40 |
| Warm Springs at mouth | 58/48 | 65/56.5 | 67/60.5 | 62/50.5 | 50/42.5 |
| Fish at mouth | 67/54.5 | 74*/64 | 74*/65 | 67/54.5 | 54/44.5 |
| Lochsa above Lowell | 67/56 | 78*67.5* | 78*/69* | 70/59 | 56/47 |
| 1959 | | | | | |
| Lochsa above Warm Springs | 51/45.5 | 68.56.5 | 66/59 | 60/51.5 | 45/41.5 |
| Warm Springs above Jerry Johnson | 50/43.5 | 57/50 | ----- | ----- | ----- |
| Warm Springs at mouth | 50/43 | 63/54 | 63/56.5 | 60/50.5 | 45/41 |
| Fish at mouth | 64/51 | 76*/62.5 | 71*/60.5 | 64/53.5 | 50/45 |
| Lochsa above Lowell | 55/50 | 74*/62 | ----- | ----- | ----- |

Boldface type shows exceedance of salmonid spawning criteria (55.4°F/13°C, 48.2°F/9°C).

An asterisk after the temperature value shows exceedance of cold water biota criteria (71.6°F/22°C, 66.2°F/19°C).

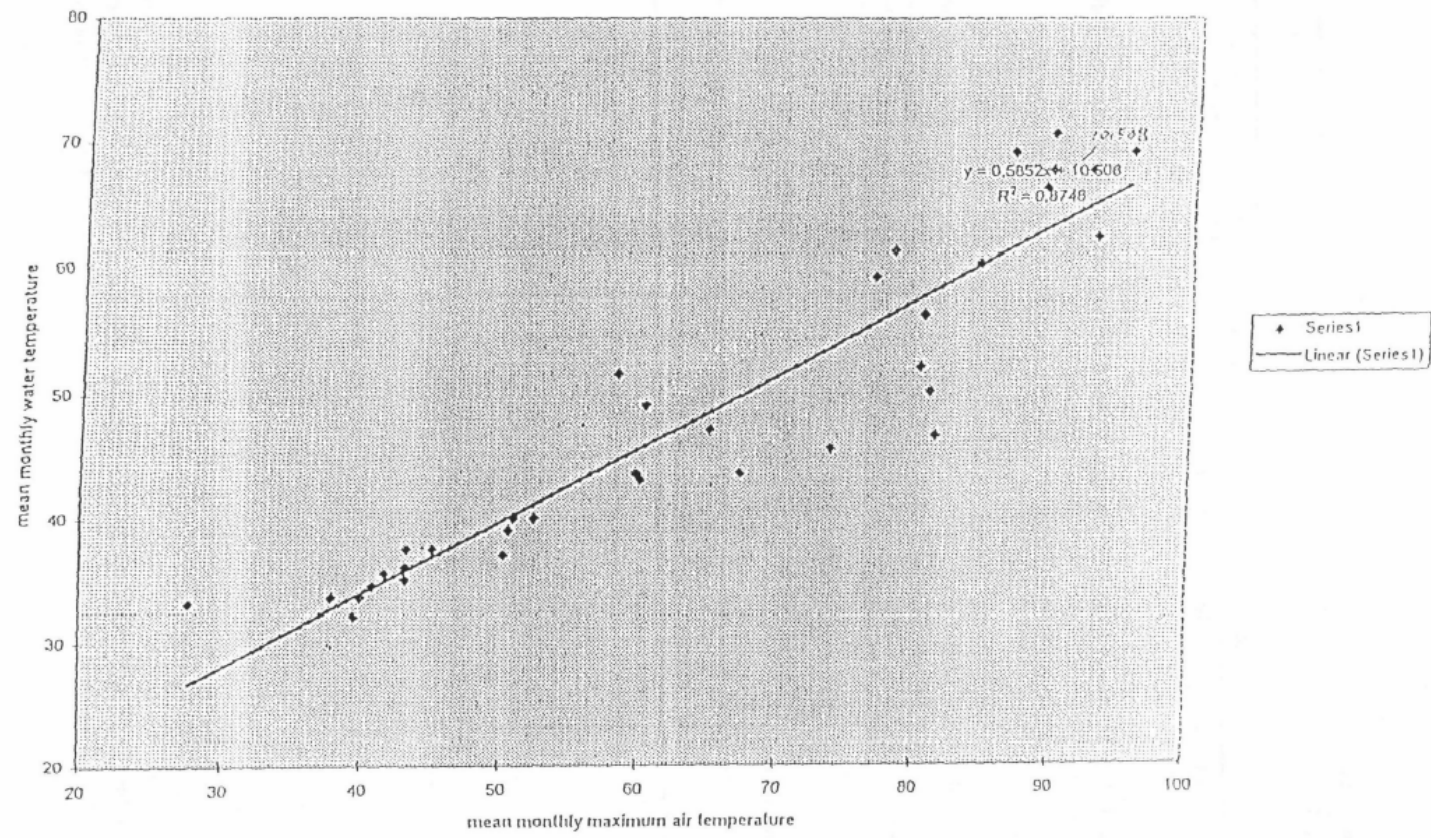
Table 7. Comparison of 1956 to 1959 Lochsa subbasin temperature records to water quality criteria

| Criterion | Criterion Temperature | Observed % of measurements exceeding criterion | Mean monthly maximum air temperature that correlates with water temperature exceedance | Predicted % of temperature exceedances |
|---|---|--|--|--|
| maximum daily average for cold water biota | 19 ⁰ C (66.2 ⁰ F) | 9.2 | 95.0 ⁰ F | 1.7 |
| instantaneous cold water biota | 22 ⁰ C (71.6 ⁰ F) | 18.5 | 104.4 ⁰ F | 0 |
| maximum daily average for salmonid spawning | 9 ⁰ C (48.2 ⁰ F) | 67.7 | 64.2 ⁰ F | 84.9 |
| instantaneous salmonid spawning | 13 ⁰ C (55.4 ⁰ F) | 80.0 | 76.7 ⁰ F | 77.2 |

The data show that, for June through October of these years, the 9⁰C and 13⁰C salmonid spawning criteria were exceeded most of the time and the 19⁰C and 22⁰C cold water biota criteria were exceeded about 10 to 20 percent of the time. Minimal forest management sources existed then. Interestingly, the same report describes a successful chinook salmon egg-planting project in Weir Creek (Welsh, 1961), downstream of the 110⁰F geothermal springs. The winter plantings in the normally ice-free reach produced an average fry survival of 78.3 percent.

These water temperature data correlate strongly with air temperature data. Linear regression of the 1956 to 1959 monthly mean water temperatures measured in the Lochsa River above Lowell with the monthly average maximum air temperatures measured at the nearby Fenn ranger station resulted in a coefficient of determination (R^2) of 0.8748 and a correlation (r) of 0.9353. Figure 10 displays the plot of these data with the regression line fitted and the equation of the regression line. By solving the equation for x and substituting the cold water temperature criteria values for y , we can predict air temperatures that correspond to the criteria water temperatures. For example, the regression equation predicts that when monthly mean maximum air temperature is 76.7⁰F, the monthly mean river temperature will equal the 55.4⁰F (13⁰C) instantaneous salmonid spawning temperature criterion. Review of the Fenn ranger station data for the period of record, 1948 to 1999, shows that 77.2 percent of the time the monthly mean maximum air temperature from June to October was greater than or equal to 76.7⁰F. This estimate compares closely with measured exceedance value of 80.0 percent from 1956 to 1959 and is within the standard error of the regression. Because the regression is based

Figure 10. Lochsa mean maximum air temp/mean water temp regression



on *average* monthly values, it will yield conservative predictions for instantaneous temperatures, i.e., we can expect that *instantaneous* temperatures will exceed the criteria temperature values more frequently than will the mean monthly temperature. This analysis of Lochsa River temperature data from before completion of Highway 12 and major timber management activities allows us to conclude that water temperatures above the water quality criteria are natural and regular occurrences in the Lochsa River.

Table 9 (p. 35) presents a summary of similar data for 1991 to 1997 for several tributary streams in the subbasin along with cutthroat trout age class structure. Table 10 (p. 36) presents similar data for temperature and rainbow trout age class structure. These data show that, although temperatures regularly exceed state criteria, the streams continue to support beneficial uses that existed as of the November 1975 Clean Water Act effective date. These data, that span 40 years and include conditions before opening of all weather road access via Highway 12, strongly support the idea that summer temperatures above the state water quality criteria are natural conditions in the subbasin and that aquatic life has successfully adapted to these conditions.

3.2. Other Water Quality Data

Cobble embeddedness, though not a water quality parameter, is discussed here because the USFS uses cobble embeddedness to gauge the effect of bedload (Jones and Murphy, 1999). The forest service sets levels of cobble embeddedness to correspond to a “Desired Future Condition” for streams. Cobble embeddedness refers to the percentage of a larger stream bed particle’s long axis surrounded by less than 6.4 millimeter particles. Some USFS surveys identify high levels of cobble embeddedness as a factor limiting fish habitat potential on some streams in the subbasin.

The USFS evaluated cobble embeddedness in the subbasin and compared those levels to fish populations with important results. They found that “*The highest sediment levels documented were in Post Office Creek, an unmanaged drainage*” (emphasis added) and that “*Managed streams were not more heavily embedded than unmanaged streams ... One of the more noteworthy findings was the stream with the highest levels of sediment (Post Office Creek) had some of the highest fish densities.*” The study in the subbasin compared cobble embeddedness and fish populations and found, “*Relationships between fish populations and sediment levels were evaluated and were not interrelated*” (Parker, Lee, and Espinosa, 1989).

The USFS found that only one of nine streams it surveyed in 1997 had cobble embeddedness levels that met its “Desired Future Conditions” and concluded that “*although these levels are higher than the desired conditions, the extent the levels are within or outside natural conditions has not been finalized.*” (USFS, 1998).

Cobble embeddedness is a lag deposit. It is neither suspended sediment nor bedload, which are, by definition, particles in transport by the stream. The lag measured as cobble embeddedness may result whenever, and wherever, a stream loses competence (the

ability to carry its sediment load). The often confusing findings reported by workers trying to compare cobble embeddedness values among drainages may be because the many factors that can affect stream competence (e.g., peak discharge, stream type, sediment particle size, sediment mineralogy, stream hydrograph, etc.) are not considered. Some studies have compared “unmanaged” with “managed” drainages with little consideration of these many variables that affect stream competence.

The Clearwater National Forest hydrologist has recently analyzed cobble embeddedness values from 1,152 unroaded reaches and 610 roaded reaches considering two of these variables- discharge (bankfull streamflow) and stream channel type. This work, summarized below in Tables 8a and 8b, sheds some light on the cobble embeddedness values in the subbasin.

Table 8a. Cobble Embeddedness versus Channel Type in Roaded and Unroaded Streams (*after* Jones, 1999)

| Channel Type | Unroaded Cobble Embeddedness (%) | Roaded Cobble Embeddedness (%) | Percent Difference |
|--------------|----------------------------------|--------------------------------|--------------------|
| A | 28.7 | 36.1 | +7.4 |
| B | 33.2 | 33.0 | -1.2 |
| C | 54.7 | 46.0 | -8.7 |
| E | 73.3 | 70.3 | -3.0 |

Table 8b. Cobble Embeddedness versus Bankfull Streamflow Class in Roaded and Unroaded Streams (*after* Jones, 1999)

| Bankfull Streamflow Class (cfs) | Unroaded Cobble Embeddedness (%) | Roaded Cobble Embeddedness (%) | Percent Difference |
|---------------------------------|----------------------------------|--------------------------------|--------------------|
| 0-20 | 40.9 | 46.2 | +5.3 |
| 20-50 | 31.7 | 35.7 | +4.0 |
| 50-150 | 26.2 | 28.6 | +2.4 |
| 150+ | 19.2 | 19.6 | +0.4 |

The cobble embeddedness measurements were determined for streams in the Lochsa subbasin between 1989 and 1998. When segregated by road versus unroaded *and* Rosgen stream channel type, it can be seen that cobble embeddedness values in roaded reaches were 7.4% higher in the A channel-type streams and lower in the B, C, and E channel type streams.

These data show that cobble embeddedness is slightly (0.4 to 5.3 percent) higher in the smaller streams than in the larger streams and that cobble embeddedness is elevated only in A-type roaded drainages when embeddedness values are segregated by stream type. Embeddedness is elevated in roaded drainages by 0.4 to 5.3 percent when embeddedness values are segregated by discharge.

Consideration of how these factors affect embeddedness analysis is important. For example, because there are so many more 0-20 cfs class drainages (956) than 150+ cfs class drainages (184), averaging embeddedness values of these two classes would skew the results toward the higher values of the smaller class. Similarly, one could compare the extremes of the range (46.2 percent versus 19.2 percent) and conclude that the difference was attributable to the roaded versus unroaded condition, when the more plausible explanation would be that this difference is attributable to the discharge class. Additionally, because cobble embeddedness is expressed as a percentage, the amount of sediment a given embeddedness value represents varies with the substrate particle size (i.e., 7.4 percent of 20mm = 1.5mm, 7.4 percent of 128mm = 9.5mm). In other words, the same percentage of embeddedness can refer to very different fine sediment thicknesses. One can see how analysis of cobble embeddedness that does not carefully consider relevant stream variables can lead to confusing conclusions.

Idaho determines if its narrative sediment criteria are met by surveying streams to verify if viable communities of aquatic organisms are present and if evidence of salmonid spawning exists in the stream. The Beneficial Use Reconnaissance Project (BURP) is a consistent scientific process used statewide for this purpose. BURP evaluations result in indices used to compare water quality with the standards to determine beneficial use support status. The Macrobiotic Index (MBI) is the first of the indices DEQ uses; supplemental information is used when needed to confirm beneficial use support status. A MBI of 2.5 or less indicates impairment, between 2.5 and 3.5 indicates that more information is needed to make a determination, and 3.5 or greater indicates that the use is not impaired. The state's procedure also specifies when to supplement the MBI with fish data, algal data, and habitat data in making these determinations.

3.3. Fish Data

This section summarizes fish data for the subbasin streams. Table 11 (p. 38) presents several monitored species and the numbers of age classes of each that were found in the streams during field surveys. The table notes when young of the year were also observed, an indicator that successful spawning and rearing occur in the stream. These data further demonstrate that the subbasin water quality provides for protection, maintenance, and propagation of an indigenous fish population.

Explanation of Tables 8 and 9 - Fish and temperature data from the Lochsa River drainage were compiled and compared. Fish data were collected through electrofishing and snorkeling surveys, and the number of age classes was estimated from length frequency distributions. The temperature data were collected with temperature data recorders, and criteria exceedances that occurred during salmonid spawning periods were counted. Spawning periods used were the default periods defined in Idaho Water Quality Standards and Wastewater Treatment Requirements (IDAPA 16.02.01.250.02.d.iv). Rows with shaded text in the following tables indicate comparisons where the fish data were collected before the temperature data; therefore, the period in which the temperature data were collected is not represented in the fish data. The numbers in the water body index (WBID) number column are the numbers assigned by DEQ for indexing Idaho waters. The estimated number of age classes represented in the length frequency distribution is provided in the Age classes column. Where juveniles appear to be included in the distribution, they are noted with the abbreviation juv.

Table 9. Summary of cutthroat trout (*Oncorhynchus clarki*) age class structure and exceedances of Idaho water temperature criteria from the Lochsa River (cataloging unit 17060303). Criteria assessed include instantaneous and daily average cold water biota and salmonid spawning during the spawning period April 1 to August 1.

| Stream | WBID no. | Fish year | Temp year | Age classes | 22EC #/% | 19EC #/% | 13EC #/% | 9EC #/% |
|----------------------|----------|-----------|-----------|-------------|----------|----------|----------|---------|
| Canyon Creek – lower | 62 | 1991 | 1993 | 2 | 0/0 | 0/0 | 6/35 | 17/100 |
| Canyon Creek – lower | 62 | 1991 | 1994 | 2 | 0/0 | 0/0 | 32/84 | 38/100 |
| Canyon Creek – lower | 62 | 1997 | 1993 | 2 | 0/0 | 0/0 | 6/35 | 17/100 |
| Canyon Creek – lower | 62 | 1997 | 1994 | 2 | 0/0 | 0/0 | 32/84 | 38/100 |
| Colt Creek – mouth | 26 | 1995 | 1993 | 4/juv | 0/0 | 0/0 | 2/22 | 9/100 |
| Glade Creek – lower | 1 | 1991 | 1993 | 3/juv | 0/0 | 0/0 | 7/23 | 31/100 |
| Glade Creek – lower | 1 | 1991 | 1994 | 3/juv | 0/0 | 0/0 | 31/82 | 38/100 |
| Nut Creek – mouth | 63 | 1991 | 1993 | 1 | 0/0 | 0/0 | 10/40 | 25/100 |
| Nut Creek – mouth | 63 | 1991 | 1994 | 1 | 0/0 | 0/0 | 32/84 | 38/100 |
| Nut Creek – mouth | 63 | 1997 | 1993 | 1 | 0/0 | 0/0 | 10/40 | 25/100 |
| Nut Creek – mouth | 63 | 1997 | 1994 | 1 | 0/0 | 0/0 | 32/84 | 38/100 |
| Placer Creek – mouth | 63 | 1991 | 1993 | 3 | 0/0 | 0/0 | 16/64 | 25/100 |
| Placer Creek – mouth | 63 | 1991 | 1994 | 3 | 0/0 | 0/0 | 34/89 | 38/100 |
| Placer Creek – mouth | 63 | 1997 | 1993 | 0 | 0/0 | 0/0 | 16/64 | 25/100 |
| Placer Creek – mouth | 63 | 1997 | 1994 | 0 | 0/0 | 0/0 | 34/89 | 38/100 |
| Polar Creek – mouth | 64 | 1991 | 1993 | 1/juv | 0/0 | 0/0 | 2/7 | 30/100 |
| Polar Creek – mouth | 64 | 1991 | 1994 | 1/juv | 0/0 | 0/0 | 19/49 | 39/100 |
| Polar Creek – mouth | 64 | 1997 | 1993 | 1/juv | 0/0 | 0/0 | 2/7 | 30/100 |

Table 9. Summary of cutthroat trout (*Oncorhynchus clarki*) age class structure and exceedances of Idaho water temperature criteria from the Lochsa River (cataloging unit 17060303). Criteria assessed include instantaneous and daily average cold water biota and salmonid spawning during the spawning period April 1 to August 1.

| Stream | WBID no. | Fish year | Temp year | Age classes | 22EC #/% | 19EC #/% | 13EC #/% | 9EC #/% |
|---------------------------------|----------|-----------|-----------|-------------|----------|----------|----------|---------|
| Polar Creek – mouth | 64 | 1997 | 1994 | 1/juv | 0/0 | 0/0 | 19/49 | 39/100 |
| South Fork Canyon Creek – mouth | 62 | 1991 | 1993 | 2 | 0/0 | 0/0 | 3/12 | 25/100 |
| South Fork Canyon Creek – mouth | 62 | 1991 | 1994 | 2 | 0/0 | 0/0 | 26/68 | 38/100 |
| South Fork Canyon Creek – mouth | 62 | 1997 | 1993 | 2 | 0/0 | 0/0 | 3/12 | 25/100 |
| South Fork Canyon Creek – mouth | 62 | 1997 | 1994 | 2 | 0/0 | 0/0 | 26/68 | 38/100 |
| Storm Creek – lower | 32 | 1994 | 1993 | 4/juv | 0/0 | 0/0 | 4/44 | 8/89 |
| Storm Creek – lower | 32 | 1994 | 1994 | 4/juv | 0/0 | 0/0 | 25/93 | 26/96 |
| Walde Creek – mouth | 64 | 1991 | 1993 | 3/juv | 0/0 | 0/0 | 7/23 | 30/100 |
| Walde Creek – mouth | 64 | 1991 | 1994 | 3/juv | 0/0 | 0/0 | 33/85 | 39/100 |
| Walde Creek – mouth | 64 | 1997 | 1993 | 3/juv | 0/0 | 0/0 | 7/23 | 30/100 |
| Walde Creek – mouth | 64 | 1997 | 1994 | 3/juv | 0/0 | 0/0 | 33/85 | 39/100 |
| West Fork Deadman Creek – mouth | 61 | 1993 | 1993 | 1 | 0/0 | 0/0 | 3/9 | 32/100 |
| West Fork Deadman Creek – mouth | 61 | 1993 | 1994 | 1 | 0/0 | 0/0 | 25/76 | 33/100 |

Table 10. Summary of rainbow trout (*Oncorhynchus mykiss*) age class structure and exceedances of Idaho water temperature criteria from the Lochsa River (cataloging unit 17060303). Criteria assessed include instantaneous and daily average cold water biota and salmonid spawning during the spawning period January 15 to July 15.

| Stream | WBID no. | Fish year | Temp year | Age classes | 22EC #/% | 19EC #/% | 13EC #/% | 9EC #/% |
|-----------------------|----------|-----------|-----------|-------------|----------|----------|----------|---------|
| Boulder Creek – lower | 40 | 1993 | 1993 | 3/juv | 0/0 | 0/0 | 4/29 | 13/93 |
| Boulder Creek – lower | 40 | 1993 | 1994 | 3/juv | 11/13 | 13/15 | 13/93 | 14/100 |
| Canyon Creek – lower | 62 | 1991 | 1993 | 4/juv | 0/0 | 0/0 | 0/0 | 0/0 |
| Canyon Creek – lower | 62 | 1991 | 1994 | 4/juv | 0/0 | 0/0 | 15/71 | 21/100 |

Table 10. Summary of rainbow trout (*Oncorhynchus mykiss*) age class structure and exceedances of Idaho water temperature criteria from the Lochsa River (cataloging unit 17060303). Criteria assessed include instantaneous and daily average cold water biota and salmonid spawning during the spawning period January 15 to July 15.

| Stream | WBID no. | Fish year | Temp year | Age classes | 22EC #/% | 19EC #/% | 13EC #/% | 9EC #/% |
|------------------------------------|-------------|--------------|--------------|----------------|-------------|-------------|-------------|------------|
| Canyon Creek – lower | 62 | 1997 | 1993 | 4/juv | 0/0 | 0/0 | 0/0 | 0/0 |
| Canyon Creek – lower | 62 | 1997 | 1994 | 4/juv | 0/0 | 0/0 | 15/71 | 21/100 |
| Fish Creek – lower | 57 | 1993 | 1993 | 4/juv | 0/0 | 0/0 | 7/50 | 14/100 |
| Fish Creek – lower | 57 | 1994 | 1993 | 4/juv | 0/0 | 0/0 | 7/50 | 14/100 |
| Fish Creek – lower | 57 | 1995 | 1993 | 4/juv | 0/0 | 0/0 | 7/50 | 14/100 |
| Fish Creek – lower | 57 | 1996 | 1993 | 4/juv | 0/0 | 0/0 | 7/50 | 14/100 |
| Fish Creek – lower | 57 | 1994 | 1994 | 4/juv | 14/16 | 17/20 | 13/93 | 14/100 |
| Fish Creek – lower | 57 | 1995 | 1994 | 4/juv | 14/16 | 17/20 | 13/93 | 14/100 |
| Fish Creek – lower | 57 | 1996 | 1994 | 4/juv | 14/16 | 17/20 | 13/93 | 14/100 |
| Fish Creek – lower | 57 | 1997 | 1994 | 4/juv | 14/16 | 17/20 | 13/93 | 14/100 |
| Glade Creek – lower | 1 | 1991 | 1993 | 3 | 0/0 | 0/0 | 1/7 | 14/100 |
| Glade Creek – lower | 1 | 1991 | 1994 | 3 | 0/0 | 0/0 | 14/67 | 21/100 |
| Nut Creek – lower | 63 | 1991 | 1993 | 1 | 0/0 | 0/0 | 2/25 | 8/100 |
| Nut Creek – lower | 63 | 1991 | 1994 | 1 | 0/0 | 0/0 | 15/71 | 21/100 |
| Placer Creek – mouth | 63 | 1991 | 1993 | 0 | 0/0 | 0/0 | 5/63 | 8/100 |
| Placer Creek – mouth | 63 | 1991 | 1994 | 0 | 0/0 | 0/0 | 17/81 | 21/100 |
| South Fork Canyon Creek – mouth | 62 | 1991 | 1993 | 3 | 0/0 | 0/0 | 0/0 | 8/100 |
| South Fork Canyon Creek – mouth | 62 | 1991 | 1994 | 3 | 0/0 | 0/0 | 9/43 | 21/100 |
| South Fork Canyon Creek – mouth | 62 | 1997 | 1993 | 2 | 0/0 | 0/0 | 0/0 | 8/100 |
| South Fork Canyon Creek – mouth | 62 | 1997 | 1994 | 2 | 0/0 | 0/0 | 9/43 | 21/100 |
| Storm Creek – lower | 32 | 1994 | 1993 | 2 | 0/0 | 0/0 | 0/0 | 0/0 |
| Storm Creek – lower | 32 | 1994 | 1994 | 2 | 0/0 | 0/0 | 8/80 | 9/90 |
| West Fork Deadman Creek – | 61 | 1993 | 1993 | 3/juv | 0/0 | 0/0 | 0/0 | 15/100 |

Table 10. Summary of rainbow trout (*Oncorhynchus mykiss*) age class structure and exceedances of Idaho water temperature criteria from the Lochsa River (cataloging unit 17060303). Criteria assessed include instantaneous and daily average cold water biota and salmonid spawning during the spawning period January 15 to July 15.

| Stream | WBID no. | Fish year | Temp year | Age classes | 22EC #/% | 19EC #/% | 13EC #/% | 9EC #/% |
|------------------------------------|-------------|--------------|--------------|----------------|-------------|-------------|-------------|------------|
| mouth | | | | | | | | |
| West Fork Deadman Creek – mouth | 61 | 1993 | 1994 | 3/juv | 0/0 | 0/0 | 8/50 | 16/100 |

Table 11. Summary of fish species and salmonid age class occurrence in the Lochsa River drainage

| Stream | WBID ¹ | Rainbow ² | Cutthroat ² | Chinook ² | Whitefish ³ | Bull Trout ³ | Brook Trout ² | Sculpin ⁴ | Dace ⁵ | Other ⁶ |
|-------------------|-------------------|----------------------|------------------------|----------------------|------------------------|-------------------------|--------------------------|----------------------|-------------------|--------------------|
| Lochsa River | 1 | 4/YOY | 6/YOY | 2/YOY | 1+ | | | M, P, T | L, S | |
| Kerr Creek | 2 | no data | | | | | | | | |
| Lochsa River | 3 | 2 | | 1 | | | | M, P, T | L, S | |
| Coolwater Creek | 4 | no data | | | | | | | | |
| Fire Creek | 5 | 4/YOY | 1/YOY | 2/YOY | 1+ | 1+ | | | | |
| Split Creek | 6 | 4/YOY | 4/YOY | 2/YOY | 1+ | 1+ | | | | |
| Old Man Creek | 7 | 4/YOY | 5/YOY | 2/YOY | 1+ | | 6/YOY | | | |
| Lochsa River | 8 | 4/YOY | 4/YOY | 2/YOY | 1+ | 1+ | | M, P, T | L, S | |
| Lochsa River | 9 | 4/YOY | 5/YOY | 2/YOY | 1+ | | | M, P, T | L, S | |
| Boulder Creek | 10 | 4/YOY | 5/YOY | | | 1+ | 5/YOY | | | |
| Stanley Creek | 11 | 3/YOY | 5 | | | | 5/YOY | | | |
| Eagle Mountain Ck | 12 | 1 | 6/YOY | | | | | | | |
| Lochsa River | 13 | 4/YOY | 4/YOY | 2/YOY | 1+ | 1+ | | M, P, T | L, S | |
| Fish Lake Creek | 14 | 3/YOY | 4 | 1 | | | | | | |
| Sponge Creek | 15 | 4/YOY | 4/YOY | | | | 4/YOY | | | |
| Fish Lake Creek | 16 | 2 | 5/YOY | 1 | | | | | | |
| Warm Springs Ck | 17 | 4/YOY | 6/YOY | 2/YOY | 1+ | 1+ | 1+ | | | |
| Warm Springs Ck | 18 | 2 | 5/YOY | | | | | | | |

Table 11. cont.

| Stream | WBID¹ | Rainbow² | Cutthroat² | Chinook² | Whitefish³ | Bull Trout³ | Brook Trout² | Sculpin⁴ | Dace⁵ | Other⁶ |
|---------------------|-------------------------|----------------------------|------------------------------|----------------------------|------------------------------|-------------------------------|--------------------------------|----------------------------|-------------------------|--------------------------|
| Wind Lakes Creek | 19 | | 5/YOY | | | | | | | |
| Lochsa River | 20 | 4/YOY | 4/YOY | 2/YOY | 1+ | | | M,P,S,T | L, S, | lamprey |
| Jay Creek | 21 | 1 | 4/YOY | | | 1 | | | | |
| Cliff Creek | 22 | 2 | 4/YOY | | | | | | | |
| Walton Creek | 23 | 2 | 3 | | | | | | | |
| White Sand Creek | 24 | 4/YOY | 5/YOY | 2/YOY | 1+ | 1+ | 1+ | S | | |
| White Sand Creek | 25 | 4/YOY | 5/YOY | 2/YOY | 1+ | 2 | | S | | |
| Colt Creek | 26 | 1 | 4/YOY | 1/YOY | | | | | | |
| Big Sand Creek | 27 | 4/YOY | 4/YOY | | | | 5/YOY | | | |
| Swamp Creek | 28 | | 5/YOY | | | | | | | |
| Big Sand Creek | 29 | | 5/YOY | | | | 4/YOY | | | |
| Hidden Creek | 30 | | 4/YOY | | | | 1 | | | |
| Big Flat Creek | 31 | 2/YOY | 5/YOY | 1/YOY | | | | | | |
| Storm Creek | 32 | 3/YOY | 6/YOY | 1/YOY | | 1 | | S | | |
| Beaver Creek | 33 | 2 | 4 | | | 4 | | | | |
| Crooked Fk-Lochsa R | 34 | 4/YOY | 4/YOY | 2/YOY | 1+ | 1+ | | S | L | |
| Brushy Fork | 35 | 4/YOY | 5/YOY | 2/YOY | 1+ | 3 | 1+ | S | | |
| Spruce Creek | 36 | 1 | 4/YOY | | | | | S | | |

Table 11. cont.

| Stream | WBID¹ | Rainbow² | Cutthroat² | Chinook² | Whitefish³ | Bull Trout³ | Brook Trout² | Sculpin⁴ | Dace⁵ | Other⁶ |
|---------------------|-------------------------|----------------------------|------------------------------|----------------------------|------------------------------|-------------------------------|--------------------------------|----------------------------|-------------------------|--------------------------|
| Brushy Fork | 37 | 3/YOY | 5/YOY | | | | | | | |
| Crooked Fk-Lochsa R | 38 | 4/YOY | 5/YOY | 2/YOY | 1+ | 3/YOY | | S | L | lamprey |
| Hopeful Creek | 39 | 3/YOY | 6/YOY | 1/YOY | | 3 | | | | |
| Boulder Creek | 40 | 4/YOY | 6/YOY | | | 3/YOY | | S | | |
| Papoose Creek | 41 | 4/YOY | 3 | 2/YOY | | 1+ | | S | | |
| Parachute Creek | 42 | 1 | 5/YOY | | | | | | | |
| Wendover Creek | 43 | 2 | 1 | | | 1+ | | | | |
| Badger Creek | 44 | 2 | 3/YOY | | | | | | | hybrids |
| Squaw Creek | 45 | 4/YOY | 4/YOY | 1/YOY | | 4/YOY | | P, S | | |
| W Fk Squaw Creek | 46 | 3 | 3 | | | | | | | |
| Doe Creek | 47 | 4/YOY | 5/YOY | | | 1 | | S | | |
| Postoffice Creek | 48 | 4/YOY | 5/YOY | 1 | | 1+ | | S | | |
| Weir Creek | 49 | 2 | 1 | | | 1+ | | | | |
| Indian Grave Creek | 50 | 2 | 5/YOY | | | 1+ | | | | |
| Bald Mountain Creek | 51 | 2 | 4/YOY | | | | | | | |
| Fish Creek | 52 | 4/YOY | 1/YOY | 1/YOY | 1+ | 1+ | | | | |
| Willow Creek | 53 | no data | | | | | | | | |
| Hungry Creek | 54 | no data | | | | | | | | |

Table II. cont.

| Stream | WBID ¹ | Rainbow ² | Cutthroat ² | Chinook ² | Whitefish ³ | Bull Trout ³ | Brook Trout ² | Sculpin ⁴ | Dace ⁵ | Other ⁶ |
|--------------------|-------------------|----------------------|------------------------|----------------------|------------------------|-------------------------|--------------------------|----------------------|-------------------|--------------------|
| Obia Creek | 55 | no data | | | | | | | | |
| Hungery Creek | 56 | no data | | | | | | | | |
| Fish Creek | 57 | 4/YOY | 2/YOY | 1 | 1+ | 1+ | | | | |
| Bimerick Creek | 58 | 3/YOY | 4/YOY | | | | 4/YOY | | | |
| Deadman Creek | 59 | 4/YOY | 4/YOY | 1 | | 1 | | P | L, S | |
| E Fk Deadman Creek | 60 | 3/YOY | 3/YOY | | | | | | | |
| Deadman Creek | 61 | 4/YOY | 4/YOY | | | | | | | |
| Canyon Creek | 62 | 4/YOY | 5/YOY | | | | | | | hybrids |
| Pete King Creek | 63 | 4/YOY | 4/YOY | 1/YOY | | | | | | |
| Walde Creek | 64 | 4/YOY | 5/YOY | | | | | | | |
| Pete King Creek | 65 | 2 | 5/YOY | | | | | | | |

¹DEQ water body identification number (Zaroban 1997).

²Integer is number of age classes reported in the water body. "YOY" indicates that young of the year are included in the age class structure. "No data" indicates water bodies for which no data was available at the time of this assessment.

³A plus sign following the integer indicates only density data was available and no age class structure was reported. More than one age class is likely present.

⁴An "M" indicates mottled sculpin (*Cottus bairdi*), "P" indicates Paiute sculpin (*C. beldingi*), "S" indicates shorthead sculpin (*C. confusus*), "T" indicates torrent sculpin (*C. rhotheus*).

⁵An "L" indicates longnose dace (*Rhinichthys cataractae*), "S" indicates speckled dace (*R. osculus*).

⁶Lamprey indicates Pacific lamprey (*Lampetra tridentata*), hybrids indicates a rainbow trout (*Oncorhynchus mykiss*) cutthroat trout (*O. clarki*) cross.

3.4. Data Gaps in Assessing Water Quality

Bedload data are known for only 16 of the 25 tributaries listed as not meeting the state sediment criterion. Particle size distribution of stream bed material and USFS cobble embeddedness estimates generally describe the stream bed.

Overall, this subbasin has voluminous data about water quality. An abundance of data does not always lead directly to answers. It often leads to more questions. This is the case with the temperature and aquatic life data in the Lochsa subbasin.

Statewide temperature criteria have been established to define when the thermal load results in an environment unsuitable to successful spawning and propagation of various aquatic life species. The assumption has been that when these temperature criteria are exceeded, the water has been polluted and made unsuitable for its designated beneficial use. In the Lochsa subbasin, we have many in-stream temperature measurements that exceed those criteria, and yet we also have abundant documentation of coincident successful spawning and propagation of the desired cold water aquatic life species. These observations raise many questions, the principal of which is, are the criteria correct? A corollary conclusion is that, because the aquatic biota the water quality standards protect are successfully sustained and are propagating, the water quality goal of the standard is being met, despite observed exceedances.

The data gaps then, are about how the temperature standard might be revised to agree with the field data. How can temporal and spatial variation in water temperature be recognized in a standard? Is the duration of exposure to some temperature a necessary component of a temperature standard? How can a temperature standard and measurements of stream temperature address the refugia available to fish? Do we need temperature standards that recognize more than cold and warm water environments? How important is a measurement protocol in an effective temperature standard? Many other questions can be explored to resolve the observed discordance between the standard and the observed beneficial use support, but that exploration is beyond the scope of this document.

4.0. WATER QUALITY DATA SUMMARIES AND STATUS CONCLUSIONS

This section summarizes the characteristics of each subbasin stream included on the 1996 303(d) list, the results of the state's investigation of the stream's water quality, and the assessment conclusions. DEQ is addressing here stream segments identified on the 1996 303(d) list created by EPA to comply with a federal court order. The 1998 list created by the Idaho DEQ and submitted to EPA does not include all these segments because DEQ's review of the available stream water quality data did not support listing them as water quality limited (Idaho DEQ, 1999).

4.1. Lochsa River Tributary Streams

The twenty-five listed tributary segments are described below at the reach that the BURP evaluation was done. The description format includes the reason the stream was included on the list, stream characteristics, human activities affecting the evaluated reach, its Macrobiotic Index (MBI), age classes of salmonid fish and numbers of young of the year, and the beneficial use status that the stream's water quality supports.

1) Badger Creek was listed for sediment.

The evaluated reach is at 3,380 feet elevation. The 6 percent reach slope is typical of a Rosgen type A channel. Its 32:1 width to depth ratio is more typical of a type B channel, and the measured discharge on 6 August 1996 was 2.7 cubic feet per second. Human activities affecting the reach include forestry, roads, and recreation.

The MBI was 5.12. Four age classes of cutthroat trout, two age classes of rainbow trout, and three age classes of rainbow/cutthroat hybrid were present in the fish sample, as were juveniles.

DEQ determined that Badger Creek's water quality provided full support of its beneficial uses because its MBI was greater than 3.5 and it was supporting salmonid spawning.

2) Boulder Creek was listed for sediment.

DEQ evaluated an upper and lower reach of Boulder Creek. The upper evaluated reach is at 4,920 feet elevation. The 7 percent reach slope is typical of a Rosgen type A channel. Its 20:1 width to depth ratio is more typical of a type B channel, and the measured discharge on 14 August 1996 was 6.9 cubic feet per second. Human activities affecting the reach include forestry and recreation.

The upper reach's MBI was 5.30. Three age classes of cutthroat trout, and three age classes of shorthead sculpin were present in the fish sample.

The lower reach is at 4,720 feet elevation. The reach is a Rosgen type B channel. Its slope is 4 percent, its width to depth ratio is 33:1, and the measured discharge on 14 August 1996 was 12.0 cubic feet per second. Human activities affecting the reach include forestry and recreation.

The lower reach's MBI was 5.12. Three age classes of cutthroat trout, two age classes of rainbow trout, one age class of bull trout, and three age classes of sculpin were present in the fish sample.

On 22 April 1996, the Clearwater National Forest requested that DEQ remove Boulder Creek from the 1996 303(d) list because *"Forest Plan standards are being met."* Additionally, on 23 December 1997, the Clearwater National Forest again requested that DEQ remove Boulder Creek from the 303(d) list because *"Forest modeling and measurements of channel stability and sediment related parameters in Boulder Creek indicate this stream is meeting all current standards."*

DEQ determined that Boulder Creek's water quality provided full support of its beneficial uses because its MBI was greater than 3.5, the habitat index of 115 was not in the impaired range, and three age classes of trout were present.

3) Brushy Fork was listed for sediment.

The evaluated reach is at 4,720 feet elevation. The reach is a Rosgen type C channel. Its slope is 2 percent, its width to depth ratio is 36:1, and the measured discharge on 15 August 1996 was 20.9 cubic feet per second. Human activities affecting the reach include forestry, roads, and recreation.

The MBI was 2.88. Two age classes of rainbow trout and three age classes of shorthead sculpin were present in the fish sample.

Also, Plum Creek Timber Company surveyed Brushy Fork Creek for macroinvertebrates on 24 June 1991 and found an assemblage (54% Ephemeroptera, 8.5% Plecoptera, 11.6% Trichoptera, 1.5% Coleoptera, 24.3% Diptera) indicating good water quality. Plum Creek Timber Company's 1993 fish survey found three size classes of cutthroat trout and juveniles on the three sampled reaches and one size class of rainbow trout on one reach.

On 23 December 1997, the Clearwater National Forest requested that DEQ remove Brushy Fork from the 303(d) list because *"Forest modeling and measurements in Brushy Fork (BLW [below] Spruce) of channel stability and sediment related parameters indicate this stream is meeting all current standards."*

DEQ determined that Brushy Fork Creek's water quality provided full support of its beneficial uses because its MBI was 2.88, the habitat index of 104 was not in the impaired range, and two age classes of trout were present.

4) Canyon Creek (upper) was listed for sediment and temperature.

The evaluated reach is at 3,936 feet elevation. The reach is a Rosgen type B channel. Its slope is 2 percent, its width to depth ratio is 25:1, and the measured discharge on 2 July 1996 was 4.0 cubic feet per second. Human activities affecting the reach include forestry, roads, and recreation.

Table 12 shows the number of temperature criteria exceedances during summer and early fall in upper Canyon Creek as compared with two nearby Selway Bitterroot wilderness area streams - Boulder and Split Creeks. The Canyon Creek watershed has had forest management activity while Boulder and Split Creeks have not. Canyon Creek has had the greatest amount of riparian harvest of subbasin streams (Jones and Murphy, 1999). In contrast, Boulder and Split Creeks flow from undisturbed, natural watersheds that are largely within the Selway Bitterroot Wilderness Area. Comparing the number of temperature criterion exceedances shows that the 9°C maximum daily average criterion for salmonid spawning was exceeded on 67 of 80 days in upper Canyon Creek and on all 80 days in Boulder and Split Creeks. The 13°C instantaneous criterion for salmonid spawning was exceeded on 41 of the 80 days in upper Canyon Creek, 66 days in Boulder Creek, and 65 days in Split Creek.

Table 12. Number of temperature criterion exceedances for period 8 July 1997 to 25 September 1997

| Stream | Temperature Criterion | | | |
|--------------------|-----------------------|------------|-----------|------------|
| | 9°C avg. | 13°C inst. | 19°C avg. | 21°C inst. |
| Upper Canyon Creek | 67 | 41 | 0 | 0 |
| Boulder Creek | 80 | 66 | 0 | 0 |
| Split Creek | 80 | 65 | 0 | 0 |

These data show that the stream temperatures are very similar on these small tributary streams although one has been subject to past forest management activities and the other two are in unmanaged watersheds flowing from a wilderness area. The stream

temperatures were even higher in the unmanaged watersheds showing that these temperatures were natural for subbasin streams during this period.

These data are consistent with other data discussed previously in Section 3.1. and later in Section 4.2. that show that high summer and early fall water temperatures are natural and regular occurrences in the subbasin to which fish and other aquatic life have adapted by means such as avoidance behavior, acclimation, and use of refugia. These data support the idea that periodic, short term exceedances of a human established temperature criterion may have little, if any, influence on the fish assemblage if other factors, e.g., habitat diversity, stream flow, cover, etc., are present (Zaroban, 1999).

The MBI was 4.3. Three age classes of cutthroat trout were present in the fish sample, as were juveniles.

DEQ determined Canyon Creek's (upper) water quality provided full support of its beneficial uses because its MBI was greater than 3.5, and, though it had temperature exceedances for salmonid spawning, it was supporting salmonid spawning.

5) Canyon Creek (lower) was listed for sediment.

The evaluated reach is at 1,800 feet elevation. The reach is a Rosgen type B channel. Its slope is 3 percent, its width to depth ratio is 22:1, and the measured discharge on 9 July 1996 was 19.6 cubic feet per second. Human activities affecting the reach include forestry and recreation.

The MBI was 4.73. Three age classes of rainbow trout were present in the fish sample, as were juveniles.

DEQ determined that Canyon Creek's water quality provided full support for its beneficial uses because its MBI was greater than 3.5 and it was supporting salmonid spawning.

6) South Fork Canyon Creek was listed for sediment.

The evaluated reach is at 2,020 feet elevation. The reach is a Rosgen type A channel. Its slope is 13 percent, its 16:1 width to depth ratio is slightly above the typical A range, and the measured discharge on 30 July 1996 was 3.9 cubic feet per second. DEQ observed no human activities affecting the reach.

The MBI was 5.20. One age class of cutthroat trout and two age classes of rainbow trout were present in the fish sample.

DEQ determined that South Fork Canyon Creek's water quality provided full support for its beneficial uses because its MBI was greater than 3.5, its habitat metrics (PQI=7.6, LOD=125 pieces) were not in the impaired range, and two age classes of trout were present.

7) Crooked Fork Creek was listed for sediment.

An upper and middle reach were evaluated. The upper reach is at 5,220 feet elevation. The reach is a Rosgen type B channel. Its slope is 3 percent, its width to depth ratio is 29:1, and the measured discharge on 14 August 1996 was 3.2 cubic feet per second. Human activities affecting the reach include forestry, roads, and recreation.

The upper reach's MBI was 4.97. Two age classes of cutthroat trout, one age class of rainbow trout, and two age classes of shorthead sculpin were present in the fish sample.

The middle reach is at 5,120 feet elevation. The 3.5 percent reach slope is typical of a Rosgen type B channel. Its slope is 3.5 percent, its 51:1 width to depth ratio is more typical of a type D channel, and the measured discharge on 14 August 1996 was 12.2 cubic feet per second. Human activities affecting the reach include forestry, roads, and recreation.

The middle reach's MBI was 4.40. Two age classes of cutthroat trout, one age class of rainbow trout, and two age classes of shorthead sculpin were present in the fish sample.

On 22 April 1996, the Clearwater National Forest requested that DEQ remove Crooked Fork Creek from the 1996 303(d) list because "*Forest Plan standards are being met.*" Additionally, on 23 December 1997, the Clearwater National Forest again requested that DEQ remove Crooked Fork Creek from the 303(d) list because, "*All the Forest modeling and measurements in Crooked Fork (Above Boulder) of channel stability and sediment related parameters indicate this stream is meeting all current standards.*"

DEQ determined that Crooked Fork Creek's water quality provided full support for its beneficial uses because its MBI was greater than 3.5, its habitat metrics (PQI=6.33, LOD=64 pieces) were not in the impaired range, and two age classes of trout were present.

8) Deadman Creek was listed for sediment.

An upper and lower reach were evaluated. The upper reach is at 2,428 feet elevation. The 5 percent reach slope is slightly above the typical range of a Rosgen type B channel. Its 25:1 width to depth ratio is more typical of a type B channel, and the measured discharge on 31 July 1996 was 4.4 cubic feet per second. Human activities affecting the reach are forestry and recreation.

The upper reach's MBI was 4.19. One age class of cutthroat trout was present. In addition, 1993 USFS data reported that three age classes of cutthroat trout and three age classes of rainbow/steelhead trout were present in the fish sample, as were juvenile salmonids.

The lower reach is at 1,625 feet elevation. The reach is a Rosgen type B channel. Its slope is 3.5 percent. Its width to depth ratio is 26:1, and the measured discharge on 30 July 1996 was 10.60 cubic feet per second. Human activities affecting the reach are forestry and recreation.

The lower reach's MBI was 4.33. One age class of bull trout, two age classes of rainbow trout, one age class of Chinook salmon, one age class of piute sculpin, one age class of speckled dace and two age classes of longnose dace were present in the fish sample.

DEQ determined that Deadman Creek's water quality provided full support for its beneficial uses because its MBI was greater than 3.5, its upper reach (PQI=5.6, LOD=78 pieces) and lower reach (PQI=7.67, LOD=95 pieces) habitat metrics were not in the impaired range, and its upper reach had three age classes of trout and its lower reach had two age classes of trout.

9) Deadman Creek, West Fork was listed for sediment.

The evaluated reach is at 2,140 feet elevation. The reach is a Rosgen type A channel. Its slope is 7 percent, its width to depth ratio is 11:1, and the measured discharge on 31 July 1996 was 3.8 cubic feet per second. Human activities affecting the reach are forestry and recreation.

The MBI was 4.45. Three age classes of rainbow trout were present in the fish sample, as were Idaho giant salamanders and juvenile salmonids.

DEQ determined that Deadman Creek, West Fork's water quality provided full support for its beneficial uses because its MBI was greater than 3.5 and it was supporting salmonid spawning.

10) Doe Creek was listed for sediment.

The evaluated reach is at 3,400 feet elevation. The reach is a Rosgen type B channel. Its slope is 2.5 percent, its width to depth ratio is 13:1, and the measured discharge on 7 August 1996 was 4.3 cubic feet per second. Human activities affecting the reach are forestry, roads, and recreation.

The MBI was 5.25. Three age classes of cutthroat trout, three age classes of rainbow trout, one age class of bull trout, and three age classes of shorthead sculpin were present in the fish sample, as were juvenile salmonids.

In a 23 December 1997 letter to the DEQ, the Clearwater National Forest asked that “*DEQ should consider retaining the WQLS*” (water quality limited segment, i.e., 303(d) listing) of Doe Creek because of damage it received during the November 1995 to February 1996 flooding and landslide events. In response to this request, DEQ visited Doe Creek in May 1999 and conducted a Pfankuch channel stability analysis that placed the stream in the low end (rating = 78) of the good category. The USFS management plan’s “Desired Future Condition” goal should reduce these legacies of earlier forest practices, particularly by controlling slope failures through the current management practice of obliteration of old mid-slope roads (Jones and Murphy, 1999). The channel showed residual effects from the 1995 to 1996 landslide events, but not to an extent that would conflict with the determined MBI and fish sample results.

DEQ determined that Doe Creek’s water quality provided full support for its beneficial uses because its MBI was greater than 3.5 and it was supporting salmonid spawning.

11) Glade Creek was listed for sediment.

The evaluated reach is at 1,900 feet elevation. The reach is a Rosgen type A channel. Its slope is 8.0 percent, its 14:1 width to depth ratio is slightly above the typical A channel range, and the measured discharge on 18 July 1996 was 2.9 cubic feet per second. Human activities affecting the reach are recreational.

The MBI was 3.76. Three age classes of cutthroat trout, one age class of rainbow trout, and one age class of piute sculpin were present in the fish sample, as were juvenile salmonids.

DEQ determined that Glade Creek’s water quality provided full support for its beneficial uses because its MBI was greater than 3.5 and it was supporting salmonid spawning.

12) Mystery Creek was listed for sediment.

The evaluated reach is at 4,265 feet elevation. The 6 percent reach slope is typical of a Rosgen type A channel. Its 29:1 width to depth ratio is more typical of a type B channel, and the measured discharge on 25 June 1996 was 2.8 cubic feet per second. Human activities affecting the reach include forestry and recreation.

The MBI was 4.81. Two age classes of cutthroat trout were present in the fish sample, as were juveniles.

DEQ determined that Mystery Creek’s water quality provided full support for its beneficial uses because its MBI was greater than 3.5 and it was supporting salmonid spawning.

13) Nut Creek was listed for sediment.

The evaluated reach is at 1,900 feet elevation. The 7 percent reach slope is typical of a Rosgen type A channel. Its 25:1 width to depth ratio is more typical of a type B channel, and the measured discharge on 10 July 1996 was 1.5 cubic feet per second. Human activities affecting the reach include forestry, mining, and recreation.

The MBI was 4.55. Two age classes of cutthroat trout were present in the fish sample.

DEQ determined that Nut Creek's water quality provided full support for its beneficial uses because its MBI was greater than 3.5, its habitat metrics (PQI=7, LOD=47 pieces) were not in the impaired range, and two age classes of trout were present.

14) Papoose Creek was listed for sediment.

The evaluated reach is at 3,400 feet elevation. The reach is a Rosgen type B channel. Its slope is 3 percent, its width to depth ratio is 18:1, and the measured discharge on 6 August 1996 was 19.7 cubic feet per second. Human activities affecting the reach include forestry, roads, and recreation.

The MBI was 4.36. Three age classes of cutthroat trout, three age classes of rainbow trout, and one age class of shorthead sculpin were present in the fish sample, as were juvenile salmonids.

In a 23 December 1997 letter to the DEQ, the Clearwater National Forest suggested "*DEQ should consider retaining the WQLS*" (water quality limited segment, i.e., 303(d) listing) of Papoose Creek because of damage it received during the November 1995 to February 1996 flooding and landslide events. In response to this request, DEQ visited Papoose Creek in May 1999 and conducted a Pfankuch channel stability analysis that placed the stream at the borderline (rating = 77) of the good and fair categories. The USFS management plan's "Desired Future Condition" goal should reduce these legacies of earlier forest practices, particularly by controlling slope failures through the current management practice of obliteration of old mid-slope roads (Jones and Murphy, 1999). The channel showed residual effects from the 1995 to 1996 landslide events, but not to an extent that would conflict with the determined MBI and fish sample results.

DEQ determined that Papoose Creek's water quality provided full support for its beneficial uses because its MBI was greater than 3.5 and it was supporting salmonid spawning.

15) Parachute Creek was listed for sediment.

The evaluated reach is at 3,800 feet elevation. The reach is a Rosgen type A channel. Its slope is 10 percent, its 16:1 width to depth ratio is slightly above the typical A channel

value, and the measured discharge on 7 August 1996 was 4.2 cubic feet per second. Human activities affecting the reach include forestry and roads.

The MBI was 4.5. Three age classes of cutthroat trout and one age class of rainbow trout were present in the fish sample, as were juveniles.

Also, Plum Creek Timber Company's 1993 fish survey found two size classes of cutthroat trout, including juveniles, in nine of twelve sampled reaches; three size classes of cutthroat trout, including juveniles, in one of twelve reaches; and one size class of rainbow trout, including juveniles, in one of the twelve reaches.

In a 23 December 1997 letter to the DEQ, the Clearwater National Forest suggested "*DEQ should consider retaining the WQLS*" (water quality limited segment, i.e., 303(d) listing) of Parachute Creek because of damage it received during the November 1995 to February 1996 flooding and landslide events. In response to this request, DEQ visited Parachute Creek in May 1999 and conducted a Pfankuch channel stability analysis that placed the stream in the upper end (rating = 89) of the fair category. The USFS management plan's "Desired Future Condition" goal should reduce these legacies of earlier forest practices, particularly by controlling slope failures through the current management practice of obliteration of old mid-slope roads (Jones and Murphy, 1999). The channel showed residual effects from the 1995 to 1996 landslide events, but not to an extent that would conflict with the determined MBI and fish sample results.

DEQ determined that Parachute Creek's water quality provided full support for its beneficial uses because its MBI was greater than 3.5 and it was supporting salmonid spawning.

16) Pete King Creek was listed for sediment.

An upper and lower reach were evaluated. The upper reach is at 3,360 feet elevation. The reach is a Rosgen type B channel. Its slope is 2 percent, its width to depth ratio is 27:1, and the measured discharge on 24 June 1996 was 4.9 cubic feet per second. Human activities affecting the reach include forestry, grazing, roads, and recreation.

The upper reach's MBI was 3.9. Two age classes of cutthroat trout and three age classes of steelhead/rainbow trout were present in the fish sample, as were juveniles.

The lower reach is at 1,804 feet elevation. The lower reach is a Rosgen type C channel. Its slope is 1 percent, its width to depth ratio is 25:1, and the measured discharge on 26 June 1996 was 25.8 cubic feet per second. Human activities affecting the reach include forestry, roads, and recreation.

The lower reach's MBI was 4.19. Two age classes of steelhead/rainbow trout were present in the fish sample, as were juveniles.

In a 23 December 1997 letter to the DEQ, the Clearwater National Forest suggested "*DEQ should consider retaining the WQLS*" (water quality limited segment, i.e., 303(d) listing) of Pete King Creek because of damage it received during the November 1995 to February 1996 flooding and landslide events. In response to this request, DEQ visited Pete King Creek in April 1999 and conducted Pfankuch channel stability analyses of two reaches that placed the stream in the good category (upper reach rating = 60, lower reach rating = 74). The USFS management plan's "Desired Future Condition" goal should reduce these legacies of earlier forest practices, particularly by controlling slope failures through the current management practice of obliteration of old mid-slope roads (Jones and Murphy, 1999). The channel showed residual effects from the 1995 to 1996 landslide events, but not to an extent that would conflict with the determined MBI and fish sample results.

DEQ determined that Pete King Creek's water quality provided full support for its beneficial uses because its MBI was greater than 3.5 and it was supporting salmonid spawning.

17) The West Fork of Pete King Creek was listed for sediment.

The evaluated reach is at 3,520 feet elevation. The reach is a Rosgen type B channel. Its slope is 2 percent, its width to depth ratio is 19:1, and the measured discharge on 4 July 1996 was 1.2 cubic feet per second. Human activities affecting the reach include forestry, grazing, roads, and recreation.

The MBI was 4.58. Two age classes of cutthroat trout were present in the fish sample.

DEQ determined that the West Fork of Pete King Creek's water quality provided full support for its beneficial uses because its MBI was greater than 3.5, its habitat metrics (PQI=7, LOD=49 pieces) were not in the impaired range, and it had two age classes of trout.

18) Placer Creek was listed for sediment.

The evaluated reach is at 2,200 feet elevation. The 5 percent reach slope is slightly above typical values for a Rosgen type B channel. Its 22:1 width to depth ratio is typical of a type B channel, and the measured discharge on 10 July 1996 was 1.4 cubic feet per second. Human activities affecting the reach include forestry, roads, and recreation. The MBI was 4.9. Two age classes of cutthroat trout and one age class of rainbow trout were present in the fish sample. In addition, 1991 USFS data reported that three age classes of cutthroat trout and three age classes of rainbow trout, as well as juveniles of each species were present in that fish sample.

DEQ determined that Placer Creek's water quality provided full support for its beneficial uses because its MBI was greater than 3.5 and it was supporting salmonid spawning.

19) Postoffice Creek was listed for sediment.

The evaluated reach is at 3,000 feet elevation. The reach is a Rosgen type B channel. Its slope is 2.8 percent, its width to depth ratio is 15:1, and the measured discharge on 6 August 1996 was 11.4 cubic feet per second. Human activities affecting the reach include forestry, roads, and recreation.

The MBI was 4.30. Two age classes of cutthroat trout, three age classes of rainbow trout, and three age classes of shorthead sculpin were present in the fish sample, as were juvenile salmonids.

On 22 April 1996, the Clearwater National Forest requested that DEQ remove Postoffice Creek from the 1996 303(d) list because "*Forest Plan standards are being met.*"

DEQ determined that Postoffice Creek's water quality provided full support for its beneficial uses because its MBI was greater than 3.5 and it was supporting salmonid spawning.

20) Shoot Creek was listed for sediment.

The evaluated reach is at 5,400 feet elevation. The 6 percent reach slope is typical of a Rosgen type A channel. Its 23:1 width to depth ratio is more typical of a type B channel, and the measured discharge on 8 August 1996 was 5.1 cubic feet per second. Human activities affecting the reach include forestry and roads.

The MBI was 5.22. Three age classes of cutthroat trout were present in the fish sample, as were juveniles. Additionally, 1994 USFS data reported two age classes of cutthroat trout present in that fish sample, as were juveniles.

On 22 April 1996, the Clearwater National Forest requested that DEQ remove Shoot Creek from the 1996 303(d) list because "*Forest Plan standards are being met.*" Additionally, on 23 December 1997, the Clearwater National Forest again requested that DEQ remove Shoot Creek from the 303(d) list because, "*Forest modeling and measurements of channel stability and sediment related parameters in Shoot Creek indicate this stream is meeting all current standards.*"

DEQ determined that Shoot Creek's water quality provided full support its beneficial uses because its MBI was greater than 3.5 and it was supporting salmonid spawning.

21) Shotgun Creek was listed for sediment.

The evaluated reach is at 4,360 feet elevation. The 5.5 percent reach slope is typical of a Rosgen type A channel, its 27:1 width to depth ratio is more typical of a type B channel, and the measured discharge on 15 August 1996 was 2.7 cubic feet per second. Human activities affecting the reach include forestry.

The MBI was 4.2. Three age classes of cutthroat trout, three age classes of bull trout, two age classes of rainbow trout, and two age classes of shorthead sculpin were present in the fish sample.

DEQ determined that Shotgun Creek's water quality provided full support for its beneficial uses because its MBI was greater than 3.5, its habitat metrics (PQI=6.6, LOD=97) were not in the impaired range, and it had three age classes of trout.

22) Spruce Creek was listed for sediment.

The evaluated reach is at 5,240 feet elevation. The reach is a Rosgen type B channel. Its slope is 2.5 percent, its 35:1 width to depth ratio is near the upper end of typical type B channel values, and the measured discharge on 8 August 1996 was 18.5 cubic feet per second. Human activities affecting the reach include forestry and recreation.

The MBI was 4.90. Three age classes of cutthroat trout, one age class of rainbow trout, and three age classes of shorthead sculpin were present in the fish sample, as were juvenile salmonids.

DEQ determined that Spruce Creek's water quality provided full support for its beneficial uses because its MBI was greater than 3.5 and it was supporting salmonid spawning.

23) Squaw Creek was listed for sediment.

The evaluated reach is at 3,400 feet elevation. The reach is a Rosgen type B channel. Its slope is 2 percent, its width to depth ratio is 21:1, and the measured discharge on 7 August 1996 was 12.4 cubic feet per second. Human activities affecting the reach include forestry, roads, and recreation.

The MBI was 4.67. Four age classes of rainbow trout, two age classes of cutthroat trout, one age class of bull trout, and three age classes of shorthead sculpin were present in the fish sample, as were juvenile salmonids and sculpins.

In a 23 December 1997 letter to the DEQ, the Clearwater National Forest recommended "*DEQ should consider retaining the WQLS*" (water quality limited segment, i.e., 303(d) listing) of Squaw Creek because of damage it received during the November 1995 to February 1996 flooding and landslide events. In response to this request, DEQ visited

Squaw Creek in May 1999 and conducted a Pfankuch channel stability analysis that placed the stream in the upper end (rating = 90) of the fair category. The USFS management plan's "Desired Future Condition" goal should reduce these legacies of earlier forest practices, particularly by controlling slope failures through the current management practice of obliteration of old mid-slope roads (Jones and Murphy, 1999). The channel showed residual effects from the 1995 to 1996 landslide events, but not to an extent that would conflict with the determined MBI and fish sample results.

DEQ determined that Squaw Creek's water quality provided full support for its beneficial uses because its MBI was greater than 3.5 and it was supporting salmonid spawning.

24) Walde Creek was listed for sediment.

The evaluated reach is at 2,830 feet elevation. The reach is a Rosgen type B channel. Its slope is 4 percent, its width to depth ratio is 13:1, and the measured discharge on 17 July 1996 was 3.3 cubic feet per second. Human activities affecting the reach include forestry, roads, and recreation.

The MBI was 4.30. Three age classes of cutthroat trout were present in the fish sample.

DEQ determined that Walde Creek's water quality provided full support for its beneficial uses because its MBI was greater than 3.5, its habitat metrics (PQI=6.6, LOD=147 pieces) were not in the impaired range, and it had three age classes of trout.

25) Walton Creek was listed for sediment.

DEQ evaluated an upper, middle, and lower reach of Walton Creek. The upper reach is at 4,640 feet elevation. The 16 percent reach slope is typical of a Rosgen type A channel. Its 17:1 width to depth ratio is more typical of a type B channel, and the measured discharge on 2 September 1995 was 2.9 cubic feet per second. DEQ did not identify any human activities affecting the reach.

The upper reach's MBI was 5.25. A 1993 Clearwater BioStudies report identified two age classes of steelhead/rainbow trout and one age class of cutthroat trout in the reach. A 1995 Clearwater BioStudies report identified three age classes of steelhead/rainbow trout, two age classes of cutthroat trout, and steelhead/rainbow juveniles present in the reach.

The middle reach is at 4,400 feet elevation. The 11 percent reach slope is typical of a Rosgen type A channel. Its 25:1 width to depth ratio is more typical of a type B channel, and the measured discharge on 2 September 1995 was 6.0 cubic feet per second. DEQ did not identify any human activities affecting the reach.

The middle reach's MBI was 4.82. A 1993 Clearwater BioStudies report identified one age class of rainbow trout and one age class of cutthroat trout in the reach. A 1995 Clearwater BioStudies report identified five age classes of cutthroat trout and juveniles present in the reach.

The lower reach is at 4,030 feet elevation. The 7 percent reach slope is typical of a Rosgen type A channel. Its 19:1 width to depth ratio is more typical of a type B channel, and the measured discharge on 2 September 1995 was 4.2 cubic feet per second. Human activities affecting the reach include recreation.

The lower reach's MBI was 5.93. A 1993 Clearwater BioStudies report identified three age classes of cutthroat trout, two age classes of rainbow trout, and one age class of bull trout in the reach. A 1995 Clearwater BioStudies report identified three age classes of cutthroat trout and juveniles present in the reach.

On 22 April 1996, the Clearwater National Forest requested that DEQ remove Walton Creek from the 1996 303(d) list because *"Forest Plan standards are being met."* Additionally, on 23 December 1997, the Clearwater National Forest again requested that DEQ remove Walton Creek from the 303(d) list because, *"Forest modeling, measurements, and observations of channel stability and sediment related parameters in Walton Creek indicate this stream is meeting all current standards."*

DEQ determined that Walton Creek's water quality provided full support for its beneficial uses because its MBI was greater than 3.5 and it was supporting salmonid spawning.

4.2. Lochsa River

The Lochsa River was listed for temperature.

The Lochsa River is an eighth order stream, draining 1,180 square miles. The Lochsa River's average bed slope is 0.011. The average stream width is 131 feet. The river's width to depth ratio varied from 12 to 61:1 in measurements at thirty-three channel cross sections. The stream bed is 95.4 percent cobble and boulder (>6 inch) size material. Various reaches are classified as B2, B2c, B3c, and C3 under the Rosgen system (Clearwater Biostudies, Inc., 1995). Human activities affecting the Lochsa River include highway transportation, recreation, and those that may affect its tributary streams as described above.

The Beneficial Use Reconnaissance Project methodology has not yet been completed for unwadable streams and for this reason the Lochsa River was not evaluated in this way. The USFS contracted a survey of channel and fish habitat conditions on the river in 1994 (Clearwater Biostudies, 1995). The survey included 1806 transects on 58 river reaches. The survey report included a comparison with a 1938 Bureau of Fisheries report on the

river. The reach overview forms used in the study included spaces for the observer to identify “*limiting factors*” and “*enhancement opportunities*.” The most commonly identified limiting factor, in 65.5 percent of reaches, was *low* amounts of spawning gravels. The Department of Fish and Game similarly found that “*A high percentage of large and medium -size rubble, restricts the suitable spawning area to 0.3 percent of the total river bottom area*” (Murphy and Metsker, 1962). These observations are consistent with the stream bed particle-size distribution being 95.4 percent cobble and boulder size material. When the 1994 and 1938 results were compared, the survey concluded that, “*This suggests that the bed of the lower Lochsa River may now contain less fine sediment than it did in 1938.*” The next most commonly identified factors and percent of reaches affected were: no pools (24.1), poor cover (22.4), no limiting factors (22.4) and low amount of woody debris (13.8). Other factors, including low winter habitat, silt, unstable channel, and poor summer and winter rearing habitat were identified on a total of five occasions. Temperature was not mentioned as a limiting factor once. No enhancement opportunities were identified on 55 of the 58 reaches (94.8 percent) and the other three suggested adding large woody debris to the channel. No enhancement activities to control stream temperature were mentioned.

Instantaneous temperature readings were taken on all 58 reaches that were evaluated in late summer, from 21 August 1994 to 18 September 1994. One reach met the 13°C instantaneous salmonid spawning criterion and all 57 of the other reaches = temperatures, ranging from 13°C to 21°C, exceeded that criterion. The observers noted “*two large bull trout*” in each of two reaches, one at 15.5°C and one at 16.0°C. A Chinook salmon redd was noted in a 16.0°C reach and two possible chinook or bull trout redds were found in a 20.0°C reach. The observer noted that, “*Age 0 salmonids and small minnows are abundant ...*” in another 17.0°C reach. Cutthroat and rainbow trout and whitefish were discovered “*in very heavy numbers*” in a 20.0°C reach, and “*several 12-inch resident trout*” were found in the uppermost reach of the river in 21°C water.

Several age classes of fish and salmonid spawning were observed in various river reaches at temperatures exceeding the 13°C criterion in this headwater to mouth survey of the Lochsa River. The survey concluded that,

Nearly all (99.8%) of this area was suitable summer rearing habitat for salmonids, and we classified 20.4% of the stream as good winter habitat. Spawning habitat for salmonids accounted for a very small portion of the total stream area and was very evenly distributed within the study area.

In summary, the 1994 study found that the most limiting factor was a lack of spawning gravels (not an excessive sediment load from its tributary streams, but less fine sediment than it had in 1938) and not temperature.

Additionally, a study of 93 streams in Idaho, Montana, and Washington found 5,021 bull trout in water ranging from 4.4 to 21.7⁰ C and “*found no difference in water temperatures between sites with and without bull trout*” (Watson and Hillman, 1997). This study points to the need for temperature criteria, such as the bull trout spawning criterion, to recognize the important distinction between summer and winter rearing and nodal habitats, the different life cycles of fish, and other factors, as mentioned above in Section 3.4 (Jones and Murphy, 1999).

Finally, the following paragraph is excerpted from a 23 December 1997 USFS letter to the DEQ regarding the USFS interpretation of the water temperature conditions in the Lochsa River that led to it being added to the 303(d) list.

In 1991, during the month of August, the mean maximum daily water temperature was 22.2 degrees Centigrade ... The State water quality standard for cold water biota is 22 degrees Centigrade. The Lochsa River only slightly exceeded this standard. In a study by Nick Gerhardt, Forest Hydrologist, Nez Perce National Forest, he found that water temperature in the Lochsa River was slightly lower (emphasis added) than that of the Selway River. This was true despite the fact that almost the entire Selway River watershed is wilderness or roadless. Water temperature on these large rivers is almost entirely associated with direct solar radiation and ambient air temperature. Because management activities on large rivers have little control over these inputs we feel the water temperature in the mainstem river is approaching natural levels. We are aware of no recent water temperature monitoring on the Lochsa River that would update these findings...The current water temperature on the Lochsa River is a natural [phenomenon] and is not associated with anthropogenic causes.

Within the constraints that the natural cobble to boulder stream bed and high summer water temperature factors limit spawning, available data indicate that the river has “*waters which are suitable ... for protection and maintenance of viable communities of aquatic organisms and populations of significant aquatic species which have optimal growing temperatures below eighteen (18) degrees C ... and which provide or could provide a habitat for active self-propagating populations of salmonid fishes.*” These data confirm that, despite regular exceedances of Idaho’s numerical temperature criteria for the stream’s beneficial uses, the existing, natural water quality provides full support for those beneficial uses.

4.3. Conclusions

This subbasin assessment addressed 26 stream segments placed on the 1996 303(d) list. Twenty-four of these were listed as not meeting the state sediment criterion only, and a twenty-fifth, upper Canyon Creek, was listed as not meeting the sediment and temperature criteria. The DEQ reviewed the available stream water quality data and these data showed the stream water quality provided full support for their beneficial uses.

Based on that review, those 25 segments were delisted for sediment from the 1998 303(d) list submitted to EPA.

The two subbasin segments remaining on the 1998 303(d) list, upper Canyon Creek and the Lochsa River, were listed as not meeting the state stream temperature criteria. The DEQ's review of the available water quality data has shown that water temperature in these streams regularly exceeds temperature criteria, but that these temperatures are natural conditions in the subbasin. The Clean Water Act (U.S. Environmental Protection Agency, 1995) intends that the state estimate total maximum daily loads when thermal discharges are not assuring "*protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife.*" The subbasin data show that the streams have propagating, balanced indigenous populations.

On the Lochsa River, stream-side shading would not control the natural direct solar radiation because the trees cannot grow tall and wide enough to shade the water surface during the hot part of the day. Point source thermal dischargers subject to control are not present on the river. Although upper Canyon Creek has had some riparian harvest and possibly could have some local benefits from increased stream-side shading, the stream temperatures are similar to, and in fact lower than, other unmanaged, natural, wilderness area subbasin streams. Point source thermal dischargers subject to control are not present on upper Canyon Creek.

The DEQ summarizes the way stream temperature conditions in the Lochsa subbasin relate to the 303(d) list and associated total maximum daily load provisions as follows. No point source dischargers are known, no one is adding heat (thermal discharge) to pollute the streams, and the stringency of other pollution control requirements does not explain the observed stream temperatures. Instead, the observed stream temperatures are the result of natural subbasin conditions. Analysis of available data, including pre-development water temperatures and recent temperatures of waters flowing from undisturbed wilderness areas (where no "*local, state, or federal*" controls are mandated because the areas are undisturbed), show that the late summer/early fall temperatures that exceed some numeric criteria in the subbasin streams are regular, natural occurrences. Also, these stream temperature conditions meet the measure of performance (assuring protection and propagation) that would be required of thermal discharges. For these reasons, the DEQ does not find estimation of a total maximum daily thermal load a high priority for these streams.

Section 303 (d) of the Clean Water Act also directs the states to prioritize the waters for total maximum daily load calculation based on "*the severity of the pollution and the uses to be made of such waters.*" The DEQ recommends that, for the present, work under Section 303 (d) stop on the Lochsa subbasin streams with this assessment. The DEQ can then act to work on high priority water quality limited stream segments. When that work is done, DEQ can revisit all the other streams that are not water quality limited and

estimate TMDLs for them for informational purposes in accordance with Section 303 (d)(3).

In summary, the DEQ's review of available data shows that the water quality of the subbasin stream segments listed in the 1996 303 (d) list supports designated and existing beneficial uses in accordance with IDAPA 16.01.02.053, and the stream segments are not water quality limited waters. The DEQ recommends that the two stream segments listed for temperature, the Lochsa River and upper Canyon Creek, should be delisted because:

- the observed numeric criteria exceedances are not caused by point source discharges subject to controls
- the segments, however, meet the measure of performance ("assure protection and propagation...") required for thermal discharges
- the available information show that the stream water quality can support the designated uses
- the observed numeric criteria exceedances are regular, natural occurrences in the subbasin
- the accepted means to control solar radiation to streams (trees to provide stream side shade) is not feasible on the Lochsa River, so developing and allocating loads would be pointless
- the water temperature exceedances on upper Canyon Creek are shown to be regular and natural occurrences when compared with unmanaged streams flowing from the Selway-Bitterroot Wilderness Area. This shows that the water temperatures are related to natural subbasin conditions, not the failure of controls by "*local, state, or federal authority.*" In this circumstance, developing and allocating loads would be pointless (and could even result in the bizarre situation of trying to fix wilderness streams).

The recommendations of this subbasin assessment are:

- That water quality information continues to show that state sediment standards are met and the twenty-five stream segments listed for sediment on the 1996 303(d) list can remain off the list.
- That the two segments, upper Canyon Creek and the Lochsa River, listed on the 1996 303(d) list as not meeting temperature standards can be delisted because the stream's water quality provides full support for their beneficial uses and the
- observed temperature exceedances are regular, natural occurrences in the subbasin and are not caused by the discharge of a pollutant that is suitable for development of a total maximum daily load.
- That management agency and landowner resources in the subbasin continue to be applied to projects to reduce legacy impacts. These activities can continue to enhance water quality in the subbasin.

References

- Alt, D.D. and Hyndman, D.W., 1972. Roadside Geology of the Northern Rockies. Mountain Press Publishing Company, Missoula, Montana. 280 pp.
- Alt, D.D. and Hyndman, D.W., 1989. Roadside Geology of Idaho. Mountain Press Publishing Company, Missoula, Montana. 393 pp.
- Boise, Lewiston, Powell & Fenn RS climate summaries obtained online from Western Regional Climate Center website at: <http://www.wrcc.sage.dri.edu/summary/climsmid.html>.
- Bond, J.G., 1978. Geologic Map of Idaho. Idaho Bureau of Mines and Geology, Moscow, Idaho, scale 1:500,000.
- Brennan, T.S., A.K. Lehmann, I. O'Dell, and A.M. Tungate, 1997. Water Resources Data, Idaho, Water Year 1997, vol. 2. Upper Columbia River Basin and Snake River Basin below King Hill, U.S. Geological Survey Water-Data Report ID-97-2, p.208.
- Clearwater Basin Bull Trout Technical Advisory Team, 1998. Bull Trout Assessment for the Lochsa and Selway Subbasins, 48 pp.
- Clearwater Biostudies, Inc., 1995. Habitat Conditions in the Lochsa River, Powell and Lochsa Ranger Districts, Summer 1994, *prepared for* USDA Forest Service, Clearwater National Forest, Orofino, Idaho. 103 pp.
- Daily weather observations for Powell & Fenn RS obtained by E-mail request from Idaho State Climate Service (climate@uidaho.edu), see also website at: <http://www.uidaho.edu/~climate/>
- Dechart, T.V., 14 June 1999 personal communication, A 1998 *Annex to Forest Practices Cumulative Watershed Effects Process for Idaho*. Cumulative Watershed Effects, Idaho Department of Lands.
- Espinosa, F.A., Jr., J.J. Rhodes, and D.A. McCullough, 1997. The Failure of Existing Plans to Protect Salmon Habitat in the Clearwater National Forest in Idaho, *in* Journal of Environmental Management, vol. 49, p. 214.
- Idaho Department of Commerce, 1997. Community Profiles for Idaho County, pp. 1-2.
- Idaho Department of Commerce, 1997. Community Profiles for Lewis County, pp. 1-2.
- Idaho Department of Water Resources, 1980. Geothermal Investigations in Idaho, Part 9, Water Information Bulletin No. 30, June 1980, pp. 22-25, 234, 297.

- Idaho Division of Environmental Quality, 1999, Idaho Division of Environmental Quality 1998 303(d) Package, pp. 11, 12.
- Jones, D., 1999. Hydrology and Water Quality Report for the Lochsa River Subbasin Analysis, 12 July 1999, Clearwater National Forest, Orofino Idaho, 39 pp.
- Jones, D. and P. Murphy, 1999. 19 May 1999 personal communication. Hydrologist and Fisheries biologist respectively, Clearwater National Forest, Orofino, Idaho.
- Karr, J. R., and E.W. Chu. 1997. Biological Monitoring and Assessment: Using multimetric indexes effectively. USEPA 235-#97-001. University of Washington, Seattle, WA.
- Lewis, R.S., R.F. Burmester, R.W. Reynolds, E.H. Bennett, P.E. Myers, and R.R.Reid, 1992. Geologic Map of the Lochsa River Area, Northern Idaho. Idaho Geologic Survey Press, Moscow, Idaho. Geologic Map Series, Scale 1:100,000.
- Lolo Pass SNOTEL data was obtained through NRCS Idaho snow survey homepage at <http://idsnow.id.nrcs.usda.gov/snow>.
- Long term departures calculated from Idaho climatic region 4 historical climate data obtained online from National Climatic Data Center - ClimVis regional data summaries, at website: <http://www.ncdc.noaa.gov/onlineprod/drought/xmrg3.html>
- McClelland D.E., R.B. Foltz, W.D. Wilson, T.W. Cundy, R. Heinemann, J.A. Saurbier, and R.L. Schuster, 1997. Assessment of the 1995 & 1996 Floods and Landslides on the Clearwater National Forest, Part 1: Landslide Assessment. A Report to the Regional Forester, Northern Region, USFS, Missoula, MT.
- Mitchell, C., 1999. 24 May 1999 personal communication. Forest Planner, Clearwater National Forest, Orofino, Idaho.
- Moore, B., 1996. The Lochsa Story: Land Ethics in the Bitterroot Mountains. Mountain Press, Missoula, Montana. 461 pp.
- Morrison, D.A., 1968. Reconnaissance Geology of the Lochsa Area, Idaho County, Idaho. Unpublished PhD dissertation, University of Idaho, 126 pp.
- Murphy, L.W. and H.E. Metsker, 1962. Inventory of Idaho Streams Containing Anadromous Fish Including Recommendations for Improving Production of Salmon and Steelhead, Part II, Clearwater River Drainage. State of Idaho, Department of Fish and Game. 197 pp.
- Parker, B.L., K.M. Lee, and F.A. Espinosa, 1989. Lochsa River Tributaries Sediment and Fish Monitoring Report, Powell Ranger District, Clearwater National Forest, USDA Forest Service, 38pp.

- Plum Creek Timber Company, 1998. *Brian Sugden letter to Don Essig (DEQ)* Re: Plum Creek's Water Quality Data in the Lochsa River Basin, 6 pp.
- Precipitation range from NARCS PRISM climate mapping project's "Idaho's Annual Precipitation" map, USDA-NRCS National Cartography & Geospatial Center, Fort Worth, TX, 1998.
- US Congress, 1968. Public Law 90-542, Wild and Scenic Rivers Act. 90th United States Congress, S.119.
- USDA Forest Service, 1994. The Clearwater Forest Plan and The Fisheries Desired Future Condition Process. 4 February 1994 memorandum to Forest Supervisor, Clearwater National Forest, p. 2.
- USDA Forest Service, 1997. Draft Environmental Impact Statement, North Lochsa Face, Lochsa Ranger District, Clearwater National Forest, Orofino, Idaho, pp. 10-29.
- USDA Forest Service, 1998. Monitoring & Evaluation Report, Fiscal Year 1997. Clearwater National Forest, Idaho, pp. 23-65.
- USDA Forest Service, 1999. Final Environmental Impact Statement, North Lochsa Face, Lochsa Ranger District, Clearwater National Forest, Orofino, Idaho, p. 15.
- US Environmental Protection Agency, 1997. 21 July 1997 Amendment to 40 CFR Part 131, Section 131.33.
- US Environmental Protection Agency, 1995. Code of Federal Regulations, Title 40, Protection of Environment, Chapter 1, Subchapter D, Part 130, Section 130.7.
- US Environmental Protection Agency, 1991. Guidance for Water Quality-based Decisions: The TMDL Process, EPA 440/4-91-001, Office of Water(WH-553), Washington, D.C.
- Watson, G. and T.W. Hillman, 1997. Factors Affecting the Distribution and Abundance of Bull Trout: An Investigation at Hierarchical Scales, North American Journal of Fisheries Management, Vol. 17, no. 2., pp. 242, 244, 247.
- Welsh, Thomas L., 1961. The planting of eyed fall-spawning chinook salmon eggs in the Clear- water River drainage. Columbia River Fishery Development Program Operational Studies Annual Progress Report, Contract 14-17-0001-364. Idaho Department of Fish and Game, p. 54. *in* Murphy and Metsker, 1962.
- Zaroban, Don, 1999. 27 May 1999 personal communication. Fisheries Biologist, Idaho DEQ and Curator of Fishes/Research Associate, Albertson College of Idaho.

Appendix

Lochsa River Subbasin Assessment Public Involvement

The Lochsa River Subbasin Assessment was presented to an ad hoc watershed advisory group on 19 May 1999. A formal watershed advisory group was not formed because a single entity, the Clearwater National Forest, manages nearly the entire subbasin. The ad hoc watershed advisory group consisted of the Clearwater National Forest, Plum Creek Timber Company, and the Nez Perce Tribe. A copy of this working draft was also sent to EPA.

The DEQ presented the subbasin assessment to the Clearwater Basin Advisory Group (BAG) on 3 June 1999. The BAG agreed with the conclusions of the subbasin assessment. DEQ asked the BAG for its guidance about whether, based on the results of the subbasin assessment, DEQ should proceed to calculate and estimate total maximum daily loads or if it should recommend delisting all the subbasin segments placed on the 1996 303 (d) list. The BAG said that DEQ's work on the subbasin should stop with the subbasin assessment, that DEQ should recommend removal of the stream segments from the 303 (d) list, and that DEQ should open the subbasin assessment to public comment.

DEQ accepted the BAG's guidance, revised the subbasin assessment based on comments from the BAG and responses received from the ad hoc watershed advisory group, and opened a thirty-day public comment period on 16 June 1999. Public notices of the comment period were placed in five Idaho newspapers. DEQ sent the Public Comment Draft to eight locations for public review, to the Clearwater BAG, and to sixteen individuals and organizations, including EPA, on DEQ's Clearwater subbasin mailing list.

Response to Public Comments

The DEQ received nine comment letters from ten organizations and individuals. Individuals and organizations that commented are coded below by number. This number is then referenced throughout the following sections. The comments are arranged by subject category.

| <u>No.</u> | <u>Date</u> | <u>Commentator</u> |
|------------|---------------|---|
| 1 | 14 June 1999* | Samuel N. Penney Nez Perce Tribal Executive Committee P.O. Box 305 Lapwai, Idaho 83540 |

- | | | |
|-----------|--------------|---|
| 2 | 13 July 1999 | Al Espinosa c/o Larry McLaud Idaho Conservation League P.O. Box 9738 Moscow, Idaho 83843 |
| 3 | 15 July 1999 | Daniel M. Johnson R.O.O.T.S. 401 4 th Street Nezperce, Idaho 83543 |
| 4 | 19 July 1999 | Brian D. Sugden Plum Creek Timber Company, L.P. P.O. Box 1990 500-12 th Avenue West Columbia Falls, Montana 59912 |
| 5 | 19 July 1999 | Kristin Ruether Friends of the Clearwater P.O. Box 9241 Moscow, Idaho 83843 |
| 6 | 19 July 1999 | Juniper Davis Idaho Conservation League P.O. Box 844 413 W. Idaho, Suite 203 Boise, Idaho 83701 |
| | 19 July 1999 | Paper, Allied-Industrial, Chemical, and Energy Workers International Union; International Brotherhood of Electrical Workers Union; International Association of Machinists and Aerospace Workers Union |
| 7a | | Phil Hughes (PACE, Local 712) RR 1, Box 87A Culdesac, Idaho 83524 |

- 7b** Phil Church (President, PACE, Local 712)
1517 9th Avenue
Lewiston, Idaho 83501
- 7c** Steve Spedden (Chief Steward, IBEW, Local 73)
3129 7th Street C
Lewiston, Idaho 83501
- 7d** Pete Ellsworth (IAM, Local 364)
Route 2, Box 14
Culdesac, Idaho 83524
- 8** 16 July 1999 James L. Caswell
26 July 1999** United States Department of Agriculture
Clearwater National Forest
12730 Highway 12
Orofino, Idaho 83544

** These comments were based on a working draft distributed to the ad hoc Watershed Advisory Group consisting of the Clearwater National Forest, Plum Creek Timber Company and the Nez Perce Tribe. Except for a few minor changes (typographical errors, etc.), this draft was identical to the Public Comment Draft.*

*** Indicates those comments received seven or more days after the close of the comment period.*

Six of the commentators supported the conclusions and recommendations of the subbasin assessment and four disagreed. Representative comments from those organizations and individuals follow.

- 1** “The hypothesis posited by IDEQ in the Lochsa River Subbasin Assessment, that the water quality present in the listed streams represents natural background conditions and the beneficial uses of salmonid spawning and cold water biota are being met, even if true, does not eliminate the responsibility of the State of Idaho to develop TMDL’s for the listed streams, as is required by the Clean Water Act. We urge IDEQ to begin development of the TMDL’s for the subbasin.”
- 2** “I am extremely disappointed in Idaho and DEQ’s latest effort to document water quality and fish habitat conditions in the Lochsa River system...They [Forest Service] have no such knowledge of the natural history or inherent stream capabilities of their systems...The State of Idaho’s intent is to remove every stream segment from the list; and thus, nullify the intent and substance of the Clean Water Act.
- 3** “...a very, very good characterization of the Lochsa Subbasin that is supported by factual information...We agree that the twenty-five stream segments should not be included on the 303 (d) list simply because they do not meet a forest management

goal...The standard should be compliance with state water quality standards...DFCs for fisheries are not forest plan standards that must be achieved. [See enclosed.]...The recommendations are fully supported by the Assessment and we agree with each of them.”

- 4 “Plum Creek is pleased to see in the Draft Subbasin Assessment that DEQ has made a thorough and objective examination of water quality data for the basin...Overall, I thought an excellent job was done in capturing the relevant issues in the basin, particularly the physical setting. This setting is critically important in defining what the inherent capabilities of the landscape are regarding sediment delivery, instream habitat, and water temperature.”
- 5 “We strongly feel that the river and its tributaries must remain listed. It is shameful how the State of Idaho consistently shirks its responsibilities under the Clean Water Act...We hope you will revise this document to include more scientific studies on the role of sediment in streams, which were left out of this, and conclude, as we do, that logging and road building must be slowed in the Lochsa basin, and road obliteration must be increased.”
- 6 “It appears to us that in this document the Idaho Division of Environmental Quality (DEQ) is off-handily choosing to reinvent criteria for determining suitable water quality in the subbasin to hastily remove streams from the 303 (d) list without concern for the streams’ actual health...Without the protection that the 303 (d) list provides, more road building, timber cuts and prescribed fires will be allowed in the Lochsa subbasin and water will be further degraded.”
- 7a, b, c, d “We agree with the recommendations of the Lochsa River Subbasin Assessment...[we] have spent months studying water quality issues in the Lochsa Subbasin...participated in field trips to review watershed conditions on federal forestlands...collaborated with groups of diverse interest to resolve water quality concerns. Our activities affirm both the watershed conditions reported and the conclusions stated in the Lochsa River Subbasin Assessment.”
- 8 “...we believe it accurately summarizes water quality in the watershed and concur with the recommendations in the draft document...available data show that the tributary stream segments...on the...list for sediment...are meeting state water quality standards and should remain off the 303 (d) list...upper Canyon Creek [and] the Lochsa River...are assuring protection and propagation of a balanced indigenous population of fish and wildlife, provide for protection and maintenance of viable communities of aquatic organisms...”

Those commentators who do not support the subbasin assessment’s recommendation to delist the stream segments express the desire to keep stream segments on the 303 (d) list to provide “protection” to the stream, regardless of whether the stream water quality can support the designated beneficial uses. These commentators also did not distinguish the

water quality standards of the Clean Water Act from other components or measures of overall stream condition including fish habitat and fish production. These two general comment topics will be discussed extensively under the first two headings, **Purpose of the 303 (d) Listing and Subbasin Assessment** and **Fish Data/Fish Populations**.

Purpose of the 303 (d) Listing and Subbasin Assessment

- 1 Discuss the purpose of the Lochsa River Subbasin Assessment and its relationship to the Clean Water Act's water quality limited list and the sediment and temperature problems in the Lochsa River subbasin.

Response: The DEQ added a discussion of the purpose of the subbasin assessment and included recommendations for actions based on the assessment's review of available information.

Section 303 (d) requires that total maximum daily loads are calculated or estimated for streams listed as water quality limited. A subbasin assessment is the first step in calculating or estimating the total maximum daily loads. The purpose of the subbasin assessment is to define the water quality problems and the pollutant sources further. When the DEQ reviewed the available water quality data for this Lochsa River subbasin assessment, it found that those data show that the stream segments are not water quality limited.

- 2 *The segments listed as not meeting the narrative sediment criterion are meeting that criterion and are therefore not water quality limited.*
- 3 *The segments listed as not meeting numeric temperature criteria do exceed some criteria under certain weather conditions, but the data show that these are regular, natural occurrences and are not appropriate for listing a stream as water quality limited.*

EPA document 440/4-91-001, Guidance for Water Quality-based Decisions: The TMDL Process, paraphrases the Clean Water Act Section 303 (d) requirements as follows:

“Section 303 (d) of the Act requires states to identify waters that do not or are not expected to meet applicable water quality standards with technology-based controls alone. Waters affected by thermal discharges are also to be identified. States are required to establish a priority ranking for these waters, taking into account the pollution severity and designated uses of the waters.”

The following paragraphs discuss how DEQ developed the Lochsa River Subbasin Assessment recommendations according to the Clean Water Act.

Section 303 (d)(1)(A) of the Clean Water Act defines when water bodies are water quality limited from the discharge of most pollutants and (1) (B) from thermal

discharges. The Clean Water Act describes thermal discharges in a separate paragraph from other pollutants, and thermal discharges are held to different measures of performance from other pollutants. Waters are listed for thermal discharges when they cannot “assure protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife,” whereas waters are listed for the other pollutants when “effluent limitations...are not stringent enough to implement any water quality standard.” Also, the states must “estimate” the total maximum daily thermal load of thermal discharges, whereas the states must “establish” the total maximum daily load for the other pollutants. These distinctions are also made in the federal regulations that describe total maximum daily loads at 40 CFR 130.7. Identification of nonpoint sources “still requiring TMDL’s” may be described at 40 CFR 130.7 (b)(1)(iii) as those for which, “Other pollution control requirements (e.g., best management practices) required by local, State, or Federal authority...are not stringent enough to implement any water quality standard applicable to such waters.”

What the DEQ is saying is that in the Lochsa subbasin, no point source dischargers are known, no one is adding heat (thermal discharge) to pollute the streams, and the stringency of other pollution control requirements does not explain the observed stream temperatures, but instead the observed stream temperatures are the result of natural subbasin conditions. Analysis of available data, including pre-development water temperatures and recent temperatures of waters flowing from undisturbed wilderness areas (where no “local, State, or Federal” controls are mandated because the areas are undisturbed), show that the late summer/early fall temperatures that exceed some numeric criteria in the subbasin streams are regular, natural occurrences. Also, these stream temperature conditions meet the measure of performance (assuring protection and propagation) that would be required of thermal discharges. For these reasons, the DEQ does not find estimating the total maximum daily thermal load a high priority for these streams.

Section 303 (d) of the Clean Water Act also directs the states to prioritize the waters for total maximum daily load calculation based on “the severity of the pollution and the uses to be made of such waters.” DEQ recommends that, for the present, work under Section 303 (d) stop on the Lochsa subbasin streams with this assessment. DEQ can then act to work on high priority water quality limited stream segments. When that work is done, DEQ can revisit all the other streams that are not water quality limited and estimate TMDLs for them for informational purposes according to Section 303 (d)(3).

Section 303 (d)(3) of the Clean Water Act directs the states to “estimate” for “the specific purpose of developing information” the total maximum daily load for “all waters within its boundaries which it has not identified under paragraph (1)(A) and (1)(B).” EPA’s guidance document paraphrases this subsection as follows:

“For waters that are not identified under sections 303 (d)(1)(A) and (1)(B) as being water quality-limited, States are to estimate TMDLs for information purposes. (US EPA, 1991)”

Estimating the total maximum daily thermal load is part of a procedure to correct water quality limited streams. Here the available data show the stream water quality is not limited by thermal discharges, no thermal discharger is present, and the streams are assuring protection and propagation. If the TMDL procedure were to proceed, one must ask himself to whom would a thermal load be allocated and of what would the implementation plan consist? Ultimately proceeding with this approach could even result in the bizarre situation of trying to “fix” wilderness streams. As discussed in Section 4.3 of the subbasin assessment, trees cannot grow tall and wide enough to shade the Lochsa River water surface and the Canyon Creek tributary stream temperature is not higher than subbasin tributary streams flowing from the wilderness area.

In summary, the DEQ’s review of available data shows that the water quality of the subbasin stream segments listed in the 1996 303 (d) list supports designated and existing beneficial uses, according to IDAPA 16.01.02.053, and the stream segments are not water quality limited waters. The DEQ recommends that the two stream segments listed for temperature, the Lochsa River and upper Canyon Creek, should be delisted because:

- *the observed numeric criteria exceedances are not caused by point source discharges subject to controls*
- *the segments, however, meet the measure of performance (“assure protection and propagation...”) required for thermal discharges*
- *the available information shows that the stream water quality can support the designated uses*
- *the observed numeric criteria exceedances are regular, natural occurrences in the subbasin*
- *the accepted means to control solar radiation to streams (trees to provide stream side shade) is not feasible on the Lochsa River and so developing and allocating loads would be pointless*
- *the water temperature exceedances on upper Canyon Creek are shown to be regular and natural occurrences when it is compared with unmanaged streams flowing from the Selway-Bitterroot Wilderness Area. This shows that the water temperatures are related to natural subbasin conditions, not the failure of controls by “local, State, or Federal authority.” In this circumstance, developing and allocating loads would be pointless (and could even result in the bizarre situation of trying to “fix” wilderness streams).*

The Clearwater Basin Advisory Group concurs with DEQ’s recommendations.

DEQ has recommended that the most prudent use of public resources is to develop TMDLs for prioritized streams that are water quality limited first, and when that is done it can develop informational TMDLs for streams that are not water quality limited.

- 2 What does it take in terms of degraded conditions to qualify for the 303 (d) list?

Response: IDAPA 16.01.02.054, Water Quality Limited Waters and TMDLs describes when water bodies shall be identified by the Department as water quality limited bodies. Essentially, the 303 (d) list is a listing of stream segments that do not meet applicable state water quality standards and which are not fully supporting designated or existing beneficial uses despite the application of required pollution controls. At a minimum, this means that the uses that were attained on or after 28 November 1975, the date of EPA's first Water Quality Standards Regulation must be protected (tier 1).

Fish Data/Fish Populations

- 2, 6 You have presented no data that describes fish habitat conditions or establishes the robustness of fish populations during that [1956 to 1959] period or prior to that period. You have presented no data that establishes the conditions of fish habitat and populations before the effects of man-caused disturbances (i.e., fires).

The assessment doesn't reveal how the fish populations are doing which, if done, would be an excellent indicator of the subbasin water's health.

Response: The subbasin assessment is examining the water quality in the subbasin, not fish populations. The presence of water quality that can support fish does not ensure that fish will be present in certain numbers. Water quality can be suitable for fish, yet fisheries can be diminished or absent for many other reasons including, but not limited to, predation, commercial and sport harvest, weather, physical barriers, and disease. Various land and fishery management agencies, for example, the Forest Service and Idaho Fish and Game Department, are charged with addressing those issues.

- 1 Young of the year data is useful, but will not aid in determining if the beneficial uses are being met. Adult abundance data is helpful for this. This comment applies to all listed tributaries in Section 4. 1.

Response: The DEQ concurs with the comment. An explanation of fish Tables 8 and 9 has been added to the assessment. Young of the year are identified in Table 10 as YOY and the numbers of adults are reported numerically. The Section 4.1. tributary data summaries include the fish sample results; if fewer than 3 adult age classes and young of the year were present, the BURP protocol specifies the use of other metrics to determine beneficial use support status. The rationale used to determine beneficial use support status is stated at the end of each summary in Section 4.1.

- 4 Data... summarized in the assessment... demonstrate that the subbasin supports a diverse and healthy macroinvertebrate community. Additionally native cutthroat and bull trout are widely distributed throughout the subbasin. Bull trout in particular are thought by many to be an indicator of high quality water.

Response: DEQ concurs that these observations support the conclusion that the stream's water quality can support beneficial uses. Although, as stated above, fish may be absent when water quality can support them, the converse is not true. Fish and other aquatic biota would not be expected to be present when water quality is not able to support them.

- 5 The fisheries section does not discuss the Endangered Species Act...yet the document claims that all fish populations are doing fine.

Response: The subbasin assessment is done to address requirements of the Clean Water Act, which is concerned with assuring water quality capable of supporting various designated beneficial uses. The subbasin assessment does not claim "that all fish populations are doing fine." The subbasin assessment is not a study of fish populations, as discussed above. Fish data are used by DEQ to confirm water quality status, but water quality evaluations are not based on fish data alone.

Protection of Water Resource

- 2, 5 If the 303 (d) status is removed, there will be less impetus for the Forest Service to attempt to keep sediment out of the water bodies.

Response: The "303 (d) status" means that a stream's water quality is not acceptable; the 303 (d) list is not a record of streams needing protection. Determining that a stream's water quality is good does not mean "there will be less impetus for the Forest Service to attempt to keep sediment out of the water bodies." The Forest Service must comply with Idaho and federal water quality law.

- 6 The DEQ must not jeopardize the future of the Lochsa through delisting. Without the protection that the 303 (d) list provides, more road building, timber cuts and prescribed fires will be allowed in the Lochsa subbasin and waters will be further degraded.

Response: The purpose of the 303(d) list is not to provide protection. It is a list of water quality limited stream segments. Streams that are not water quality limited are protected by the applicable water quality standards.

The Clean Water Act provides for protecting stream water quality at various levels by its anti-degradation provisions. State water quality standards consist of three parts, a designated beneficial use, water quality criteria, and an anti-degradation statement. Under the Clean Water Act, anti-degradation statements provide three tiers of protection.

The first tier is that the level of water quality necessary to protect those beneficial uses actually attained in waters on or after 28 November 1975 shall be maintained and protected. Tier 1 provides the absolute floor of acceptable water quality for all waters of the United States and is the default when no higher level has been established.

The second tier provides that where the quality of the waters exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the Department finds, after an extensive public process, that lowering water quality is acceptable. In no case can a petition to degrade water quality result in lowering water quality below the tier 1 level.

The third tier is designated Outstanding Resource Waters that are considered an outstanding national resource. New or increased discharges to these waters are severely limited.

Idaho Water Quality Standards include Special Resource Water and Outstanding Resource Water categories. The waters must be formally designated as such. In the Lochsa River subbasin, the Lochsa River has been designated as a Special Resource Water. The protections provided by those designations are described at IDAPA 16.01.02.055 and .056. Water quality data from current basin status reports, such as a subbasin assessment, that can establish that water quality is now at a higher quality than existed on 25 November 1975 may be used to support a nomination for designations above tier 1.

- 2, 5 You assert that since the sediment loads are “naturally” high (due to landslides and natural background levels) and the temperatures are “naturally” increasing (due to rising temperature trends), then you can only throw in the towel and give up on controlling water quality.

Response: The available data evaluated in the subbasin assessment show that the water quality in the subbasin streams is meeting the sediment criterion. This is the reason the

assessment recommends delisting those segments listed for sediment, i.e., they are not water quality limited for sediment and do not belong on a list of water quality limited streams (the 303 (d) list).

The evaluation of stream temperatures found that late summer and early fall stream temperatures appear to have regularly exceeded some numeric criteria, not “due to rising temperature trends”, but whenever certain air temperatures have been attained. The regional weather records going back to 1895 show that those temperatures occur regularly. Accepting that the cold water biota and fish have been viable and propagating in these natural conditions does not say that we “give up on controlling water quality.” Rather, the DEQ is not endorsing the idea that we need to control or fix this natural condition.

- 2, 5** Systems with naturally high sediment and high temperatures are even more susceptible to losing their beneficial uses and must be protected from further degradation.

Response: The DEQ agrees that management practices must be appropriate for the environmental conditions in which they are used.

Wild and Scenic Rivers

- 1** Clarify the status of the Lochsa under the Wild and Scenic river designation, and describe the level of protection this designation mandates.

Response: Most of the Lochsa River, from its mouth to Powell (just below its headwaters) is designated as a “recreational river area” under the Wild and Scenic Rivers Act. The Wild and Scenic Rivers Act limits: licensing dams and other project works (under the Federal Power Act), new commercial or industrial uses, sale of associated public lands, and mining activities. That designation is one of the characteristics that may qualify a stream for designation in Idaho as a Special Resource Water (IDAPA 16.20.02.056.01.e). Special Resource Waters and their tributaries have restrictions of point source discharges as specified in 16.20.02.400.01.b. which states,

“Except as noted in section 400, no new point source can discharge pollutants, and no existing point source can increase its discharge of pollutants above the design capacity of its existing wastewater treatment facility, to any water designated as a special resource water or to a tributary of, or to the upstream segment of a special resource water: if pollutants significant to the designated beneficial uses can or will result in a reduction of the ambient water quality of the receiving special resource water as measured immediately below the applicable mixing zone.”

State Water Quality Standards and USFS Desired Future Conditions

- 5 It is perplexing why the document repeatedly labels the Forest Service's Desired Future Conditions as far too stringent for the state to comply with. DFCs are merely the Forest Service's phrase for attempting to follow the Clean Water Act and FULLY support beneficial uses.

Response: Pollutant dischargers must comply with water quality standards. The Clean Water Act directs that the States establish water quality standards.

- 2 On page 22, DEQ launches into a discussion of the Forest Service's "Desired Future Conditions" (DFCs) and their relationship to water quality standards. DFCs are not management goals. They are management objectives linked to the Forest's standards for water quality and fish habitat (Espinosa, 1992). DEQ is correct when it states that DFCs are not state water quality standards. In essence, they [Idaho] have no water quality standards.

Response: The discussion of DFCs has been revised. The point of the section is that the Idaho standards, not DFCs, are appropriately used to determine water quality limited status for Section 303 (d). Idaho developed water quality standards under the Clean Water Act beginning in the 1970s; they are found at IDAPA 16.01.02. Use of these state water quality standards to determine whether or not stream water quality can support a designated beneficial use is appropriate under the Clean Water Act.

- 3 Forest service DFCs for fisheries are not forest plan standards that must be achieved. [See enclosed.]

Response: A photocopy of the official Forest Service opinion, dated 4 February 1994, that was enclosed with the comment, "regarding the nature of the Forest's Desired Future Condition (DFCs) for fisheries and their relationship to the Forest Plan" states that, "These DFCs are appropriate, provided they are not used as a standard that must be achieved." DEQ concurs that the opinion and supporting Forest Service documents clarify that the DFCs are an internal Forest Service management tool.

- 4 In the excerpt from USFS (1998), the word “desired” is used regarding rearing temperature criteria. I am not sure if they are referring to Forest Plan standards, state standards, or their internal standards. Regardless, it is pretty awkward to talk about “desired criteria.”

Response: While “desired criteria” appears to be an oxymoronic phrase, it is consistent with the Forest Service management plan’s description of “Desired Future Conditions” as visualizations of how the forest will look if management plans produced expected results. This use of “criteria” is different from the Idaho water quality criteria that are components of the state water quality standards used to determine Clean Water Act compliance.

The Physical Setting of the Lochsa River Subbasin

- 1 Eliminate “...suggests a connection to hot rocks below.” Sentence could read, “There are numerous geothermal springs in the subbasin.”

Response: The suggested language does not help the reader understand the importance of the several observations about subbasin geothermal springs and their relevance to surface water temperature.

- 1 End paragraph after sentence beginning with “Middle elevations, between about 3,000 and 5,000 feet” Eliminate mention of the No-see-um slide. The paragraph is a general description of a climatic phenomenon that has occurred for perhaps thousands of years; recent landslide events should not be mentioned here.

Response: The DEQ concurs with the commentator’s interpretation that this climatic phenomenon has occurred for perhaps thousands of years. For this reason, it is important to give an example of the continuation of these processes into recent memory to help the reader understand that these conditions are regular and natural in the subbasin.

- 2, 5 The No-See-Um Creek landslide was described as a “natural” landslide, but the No-See-Um Creek drainage has been extensively burned through prescribed burns ignited by the Forest Service.

Response: The Clearwater National Forest has confirmed that it is not presently conducting prescribed burns in the No-See-Um Creek drainage and that staff knew of no prescribed burning ever having been conducted in this drainage.

- 4 ...the physical setting...is critically important in defining what the inherent capabilities of the landscape are regarding sediment delivery, instream habitat, and water temperature. Additionally, the low-elevations, warm summertime air temperatures, and geothermal influences create a template for naturally warm mainstem river temperatures.

Response: The DEQ concurs with the comment. Understanding sedimentation in the Lochsa River subbasin requires consideration of the critical components of geology, climate, topography, and fire. Understanding water temperatures in the subbasin requires consideration of the ground water temperatures, and of the regional and local air temperature and precipitation data.

- 3** It is not sound science to base all conclusions for the Lochsa subbasin on only a four year study period in the 1950's. Assuming these years are a good representation of the entirety of the Lochsa's natural state is not acceptable. Much further analysis needs to be done to determine what this should be.

Response: The DEQ concurs that conclusions should be based on available data and not limited to a four-year period in the 1950s. That is why temperature data characterizing subbasin conditions have been summarized in the assessment as follows: Table 1, air temperature data from 1993 to 1997; Figure 4, air temperature data from 1948 to 1997; Figure 5, air temperature data from 1960 to 1997 compared to the mean from 1895 to 1997; Table 3, air temperature from 1935 to 1995; Table 8, water temperature from 1991 to 1997; Table 9, water temperature from 1991 to 1997; and the pre-development water temperature data set from the Lochsa River from 1956 to 1959.

The strong correlation between air and water temperature shown in Figure 9 suggests that air temperature has a very strong effect on water temperature. The relationship is consistent with the common observation that when hot weather persists, water temperatures rise. If the relationship established in Figure 9 is correct for other years, we can predict expected water temperatures for recorded air temperatures. The air temperature record is much longer and more complete than the water temperature record, extending back to 1895. The exercise indicates that water temperatures exceeding some numeric criteria would have been a regular part of life in the subbasin over the last 100-plus years of record.

Peak Flow

- 1** Eliminate the two hypotheses about the timing of peak flows. Speculation should not be a part of a subbasin assessment.

Response: The DEQ agrees that random speculation has no place in the document, but data analysis does. Examination of the subbasin hydrograph for alteration through time is a reasonable step in understanding the subbasin hydrology.

- 4** While the discussion of peak flow timing is interesting, it would be helpful to see the data and statistical analysis so the reader can review and evaluate.

Response: DEQ has revised the subbasin assessment to present the data as Figure 9.

Landslides

- 2, 5 The subbasin assessment describes the No-See-Um Creek landslide as natural and the watershed as unmanaged and unroaded. At best, this is arguable. The watershed is unroaded-however, it has been prescribed burned repeatedly over the years for big game winter range. It has also experienced the effects of man-caused and man-enhanced fires over the years. Definite channel changes and impacts have been observed in the Lochsa downstream from the landslide's entry site.

Response: As stated above, the Forest Service is not aware of any prescribed burning in the No-See-Um Creek drainage.

The DEQ agrees that the subbasin has experienced the effects of man-caused and man-enhanced fires over the years. Early western explorers commented on these practices, for example: "The Columbia Basin landscapes Lewis and Clark saw were richly peopled. They were also managed by indigenous people, who took action to maintain the natural resources they relied on. Some of these actions were symbolic-returning the first salmon caught in the spring to the river so that more would follow- and some were pragmatic-setting fires to create clearings for huckleberries and other important food plants." (Columbia River Inter-Tribal Fish Commission, 1999). The importance of fire in the subbasin is discussed in the fourth paragraph of the executive summary and in Section 1.2.1. Section 2.3.1. has been reworded to reemphasize the role of fire in sedimentary processes in the subbasin.

That landslides cause "definite channel changes and impacts" in the subbasin is precisely the point of this section. The section points out that the historical and geomorphic evidence suggest events of this magnitude and effect have occurred regularly in the subbasin for thousands of years, during the time fish and aquatic resources are believed to have flourished. Sedimentation in the subbasin is not a steady-state process, but rather is dynamic, and is characterized by episodic, catastrophic sediment inputs.

- 2, 5 What are the cumulative impacts [of the landslides] on the Lochsa River?

Response: The effects of the landslides on subbasin streams are discussed in Section 3.1 and Section 4.2.

When the landslide material reaches a stream, the particles that are too large to transport form a channel bar. Good examples of older channel bars can be seen between Cat Creek and Canyon Creek (~ mile marker 101.6), two miles upstream of No-See-Um Creek (~mile marker 126), at several locations between Indian Grave Creek and Weir Creek (~mile 139.5 to 143.5), and two miles upstream of Badger Creek (~mile 157.8). Very large trees growing on these channel bars suggest the age of the bars.

The immediate effect of landslide deposition is to cover the stream bed under the channel bar footprint and to increase sediment load. Debris flow landslides flowing down stream channels can scour channel bottoms of sediment, as happened in No-See-Um Creek, resulting in too little sediment for quality fish habitat. The long term (long relative to human lifespan, not the stream's) effects include altering the stream by scouring channel bottoms, creating new riffles and pools, and forming beaches. In the climatic regime of the last century, it appears that flood conditions associated with major landslides occurred about every ten to fifteen years.

2, 5 Have the Lochsa and tributaries recovered from the landslides?

Water quality status conclusions for the Lochsa and its tributaries are found in sections 4.1. and 4.2. A 1994 survey of 1806 transects on 58 river reaches of the Lochsa River compared stream bed particle-size distributions with those from a similar 1938 survey and found "...that the bed of the lower Lochsa River may now contain less fine sediment than it did in 1938." The 1994 study shows that the cumulative effect of the landslides from 1938 to 1994 did not increase fine sediment in the river (95.4 percent of the river bed is cobble and boulder size material). A similar survey of the Lochsa River has not been conducted since the 1995-1996 landslide event.

The Forest Service monitored a small tributary of Squaw Creek that was affected by an upstream fire in the Opus 7 logging unit and a subsequent landslide in November 1995. The sediment sampling and analysis showed that the water quality of the tributary recovered to the pre-landslide concentrations after two years.

5 What lasting damage occurred?

It is important to understand that this is a dynamic system. The idea of "lasting damage" can be misleading in this context of constant change as the normal condition. The expected cycle of sedimentation in the subbasin, based on the available information, is: a major precipitation (and/or snow melt) event triggering landslides, formation of new channel bars and adjustment of stream flow and channel characteristics, and associated elevated sediment concentrations (the extreme effect occurring in a period of days) occurring over about two years, followed by stabilizing sediment concentrations for the next eight to thirteen or so years, and then another catastrophic event renewing the cycle.

5 How did the slides affect fish populations?

The DEQ has found the water quality in the subbasin to be capable of supporting cold water biota and salmonid spawning. Obviously, during a landslide the water quality at the slide would be very different from the conditions elsewhere in the basin. Fish would be expected to respond to the landslide with avoidance behavior. However, the study of fish populations is not part of this assessment. The Idaho Department of Fish and Game, Nez Perce Tribal Fisheries Program, and the Clearwater National Forest Fisheries Biologist may be able to provide fish population information, but DEQ does

not know if they can separate the effects of landslides on populations from all the other factors that can affect populations.

- 5 Overall, the correlation between logging/roading and landslides is severely underreported in the document.

Response: Section 2.3.1. reports that USFS data showed that about two-thirds of the landslides in the 1995/1996 events were related to management activities; 58 percent were road related and 12 percent were associated with timber harvest. The subbasin assessment also states that these findings are similar to those for the last major landslide event in 1974. The subbasin assessment points out that, for water quality issues, the volume of sediment delivered to streams is more relevant than the number of slides (small failures far from streams may not contribute any measurable sediment to streams).

The best available data estimate that the sediment volume delivered to streams was apportioned as follows: 25% from roads, 4% from timber harvest areas, and 71% from natural landslides. The DEQ has revised the subbasin assessment to include this detail.

- 4 Nice job pointing out that one natural landslide was a very large % of the volume of sediment delivered to streams. If these data were broken out for the Lochsa alone, it would be even more staggering.

Response: DEQ concurs that more detailed analysis of the Lochsa Subbasin landslides would further support the point, but believes the point is clear and does not believe that level of analysis is necessary.

Land Ownership

- 1 The Federal Government is not a landowner. Add the Nez Perce Tribe's connection to the land, i.e., "The Lochsa River subbasin is within the Nez Perce Tribe's ceded territory as determined by the Indian Claims Commission and described in Docket 175 18 I.C.C. 1,1 1. (See attached) The Nez Perce Tribe has rights reserved by the Treaty of 1855 with the United States to take fish at all the usual and accustomed places and to hunt, gather, and pasture on all open and unclaimed lands including areas within the Lochsa River subbasin.

Response: The DEQ has corrected statements about the ownership of the public lands in the subbasin to identify the owner as the United States.

- 1 Include the Nez Perce Tribe's historical and legal connection to the Lochsa River subbasin.

Response: Please refer to the response to comment below.

- 4 Much of this discussion seems extraneous to the water quality issue at hand. I would suggest simply presenting the areas of the subbasin that are owned by various entities.

Response: The suggestion to simplify the section has been accepted and the section has been revised accordingly.

Land Use

- 1 State the basis, if any, for determining and concluding that logging is the primary economic activity in the subbasin.

Response: References have been added and the statement reworded to reflect the importance of logging as an economic activity in the subbasin. Data from the Idaho Department of Commerce shows that the lumber and wood products industry comprises 11.3% of the non-farm employment in Idaho County and 10.3% in Lewis County. The first and third largest employers in Lewis County in 1997 were Three Rivers Timber, Inc., and Kamiah Mills respectively.

- 1 In the last paragraph eliminate the word "may" from the sentence beginning "The area's wilderness and...."

Response: The assessment has been revised to provide data about the recreational usage of the river, but those data do not include information about why those users chose this location or if they were even aware of these designations. Because we do not know these things, the use of "may" to qualify the statement as possible, but not known, is appropriate here.

- 4 I highly encourage DEQ to display the percentage of the subbasin that is in Wilderness. It would also be useful to list the percentage of the subbasin that is not in the timber base for the Clearwater NF (i.e., "defacto" Wilderness). This information would be helpful to provide context for the amount of potential disturbance in the subbasin.

Response: The acreages and calculated percentages have been added to Section 1.3.2, as suggested.

Pebble Counts

- 1 This section should contain data about the substrate of the listed stream segment. Have Wolman Pebble Counts been done? If not, they should be.

Response: Wolman pebble counts are part of the BURP protocol that was conducted on all the tributary streams. The Lochsa River substrate particle size was also determined and was reported in Section 4.2.

- 1 More bedload data is needed for streams within the subbasin. Wolman pebble counts would help determine base-line conditions.

Response: Additional bedload data were located and a discussion of these has been added to Section 3.1.

Water Temperature

- 1 The data gaps do not suggest the temperature standard needs to be revised.

Response: The discussion in Section 3.4. points out that the discordance between the observations of balanced, propagating indigenous fish and wildlife populations and temperatures greater than the criteria might be appropriately addressed through revision of the standards, and further concludes that exploration of the standards questions is beyond the scope of this document.

- 8 It is also correct not to list upper Canyon Creek or the Lochsa River for exceeding temperature standards since these streams are assuring protection and propagation of a balanced indigenous population of fish and wildlife, provide for protection and maintenance of viable communities of aquatic [organisms] and the observed temperature exceedances are a regular, natural occurrence in the subbasin.

Response: The comment is noted. These recommendations of the DEQ were supported by the Clearwater Basin Advisory Group.

- 8 The Forest does not support adding additional streams to the 303 (d) list for the Lochsa subbasin based on temperature.

Response: The DEQ concurs with the comment, assuming additional temperature exceedances occur under similar conditions, i.e., the stream temperatures are regular, natural occurrences in the subbasin, and the stream water quality is assuring protection and propagation of a balanced indigenous population of fish and wildlife and is providing for the protection and maintenance of viable communities of aquatic organisms. Under different conditions, for example operation of a thermal discharge that did not provide those assurances and protections, the DEQ would support listing streams for thermal discharges.

- 5 You assert that the two segments previously on the list due to not meeting temperature standards be delisted because, in part, the problem is “not caused by the discharge of a pollutant (emphasis added) that is suitable for development of a total maximum daily load” (p.ii). We disagree. The segments were also listed for sediment values. The pollutant is sediment. Increased sediment also causes increased temperatures through increased light absorption. There is a simple answer for reducing sediment loads in the segments: reduce logging and road building in the watersheds, and accelerate road obliteration.

*Response: Please refer to the response to **Purpose of the 303 (d) Listing and Subbasin Assessment** for a discussion of the Clean Water Act language “discharge of a pollutant that is suitable for development of a total maximum daily load.”*

The hypothesis that sediment causes increased water temperature in the subbasin relates to two subbasin segments, the Lochsa River and upper Canyon Creek, that were placed on the 1996 303 (d) list for exceedances of numeric temperature criteria. The Lochsa River was listed for temperature only. Upper Canyon Creek was listed for temperature and sediment. Twenty-four other subbasin segments were listed for sediment only. Nationally thousands of segments are listed for sediment. If this hypothesis were true, one would expect all streams listed for sediment to also be listed for temperature. This is not the case.

Consider the hypothesis that “increased sediment also causes increased temperatures through increased light absorption” for Lochsa subbasin streams. The stream bed of these streams is made of sediment. This sediment on the stream bed comes from the rocks in the subbasin. When a stream segment is identified as water quality limited because of sediment, it is because of an excess of sediment beyond the stream’s transport capability (competence). The excess sediment is the same sediment as is found in a stream that is not water quality limited, there is just more of it. The excess sediment has the same light absorption (albedo) as does any other amount of sediment on the stream bed. The presence of more of the same sediment would not be expected to change the albedo and raise water temperatures.

Additionally, the subbasin rocks (mica schists, calc-silicate gneiss, granodiorite) are typically light-colored silicates that have a high albedo, that is they reflect light rather than absorb light as dark rock would. The beautiful white sand beaches are made of the subbasin sediment.

Excess sediment could, in some areas, effect increased water temperatures if the sediment caused the stream to become wider and shallower. For example, a “C” type stream could change to a “D” or “F” type stream as excess sediment on the stream bed caused stream flow to push against and erode channel banks. However, the dominant “A” and “B” type streams in the Lochsa subbasin generally have lateral migration limited by bedrock valley walls. Because of this, the subbasin streams are not very susceptible to this kind of channel change. For these reasons, the DEQ does not believe that sedimentation is generally causing higher stream temperatures in the Lochsa subbasin.

Vegetation

- 1** Add a section about the presence of invasive, non-native plant species, and specifically mention spotted knapweed and its detrimental effects on soil and water conservation.

Response: A statement will be added noting that invasive, non-native plant species, such as spotted knapweed, may affect soil and water conservation.

- 1 Prioritize list of non-point sources of pollution by magnitude of contribution from each source. Include non-native vegetation such as spotted knapweed as a non-point source of pollution.

Response: As stated in subsection 2.3.1., the precise pollutant contributions from the nonpoint sources are unknown, making prioritization by magnitude of contribution impossible. As pointed out in the comment below, the water quality impacts of spotted knapweed are unknown and for this reason it is not appropriate to list it as a non-point source of water pollution.

- 1 Include spotted knapweed. The water quality impacts of spotted knapweed establishment in the Lochsa Subbasin is unknown due to a lack of study on the subject.

Response: DEQ will add a statement to section 2.3.2. noting the commentator's observation.

Sediment

- 2 The data is for only suspended sediment not bedload. With reference to fish habitat, the primary issue is bedload sediment and its deposition in the substrate. You have established no linkage between the suspended sediment loads and fish habitat quality.

Response: The narrative sediment criterion (See Section 2.2.), when applied in the subbasin, says that sediment shall not result in water quality that cannot support cold water biota and salmonid spawning. The DEQ has determined, through its standardized procedures, that the water quality supports those uses and excess sediment, as suspended or bedload, is not violating the water quality criterion. Section 3.1. discusses both bedload and sediment load.

- 2 The 1997 data you have presented for the tributaries shows levels of suspended sediments well elevated above the average. How does this support your case for compliance with the Clean Water Act?

Response: As discussed in Section 3.1, the elevated concentrations measured in 1997 can be explained by the landslide events of the 1995/1996 winter. Compliance with the Clean Water Act is based on meeting established sediment criterion. Comparison of extreme hydrologic events with average conditions does not lead to the conclusion that there is a problem. For example, higher than average suspended load and bedload will be expected every year during spring runoff. Similarly, during or following extreme summer rainstorms, higher than average sediment concentrations will be expected. Fish and aquatic biota have adapted to these fluctuations after millions of years of living with them. It is not surprising that after a landslide event, believed to be one of the most extreme of the century, sediment levels would be elevated as compared to

average. As discussed in Section 3.1., this pulse is expected to subside with the return of more normal climatic conditions.

- 2 What were the bedload levels? To what extent was cobble embeddedness elevated in these drainages?

Response: Section 3.1. reports that the forest service determined from monitoring 16 of the 25 stream segments listed on the 1996 303 (d) list that bedload comprises 5 to 10 percent of the total sediment load in the subbasin. Because the stream water quality has been determined, through Idaho's standardized procedures, to meet the sediment criterion, more detailed analyses of sedimentation was not justified.

Cobble embeddedness is a lag deposit. It is neither suspended sediment nor bedload, which are, by definition, particles in transport by the stream. The most recent data from the Lochsa subbasin show cobble embeddedness values that range from no elevation above unmanaged drainages to 7.4 percent greater than unmanaged drainages. A discussion of recent cobble embeddedness values from subbasin streams has been added to Section 3.2.

Aquatic Life

- 5 The IDFG lists coho as being extinct in Idaho. Your assessment claims the coho inhabits the Lochsa subbasin. Which is correct?

Response: The coho is not indigenous to the Lochsa subbasin, nor have they been established there. The listing in Section 1.2.2. was a transcription error and the section has been corrected accordingly.

- 1 Remove "golden trout" from the list of fish occurring in the subbasin. To our knowledge these fish do not exist here.

Response: "The largest golden trout of record in Idaho was 5 pounds 2 ounces taken from White Sand Lake in the Lochsa River drainage in 1958" - Simpson, J. and Wallace, R., 1978. The Fishes of Idaho. The University Press of Idaho, Moscow, Idaho. p. 81.

- 1 Also, "Chinook (in first sentence should be lowercase, as in, chinook).

Response: The "C" in "Chinook" was changed to the lower case "c."

- 1 Add scientific names following common names.

Response: The genus and species names have been listed following the common names.

Beneficial Uses

- 2 I am convinced that DEQ would determine that a parking lot with one inch depth of water and supporting one salmonid fry meets their beneficial use criteria and would qualify for non-impairment status.

Response: This comment seems to speak to the need to distinguish among water quality that is able to support a beneficial use and all the other factors that affect fisheries. Please refer to the comments on Fish Data/Fish Densities above for more information.

- 2 The Clean Water Act and Idaho's anti-degradation policy requires that beneficial uses be **fully** supported- not partially supported, almost supported, minimally supported, quasi-supported, or just supported. As stipulated by federal regulations, the states must guarantee full protection of existing beneficial uses when allowing any water quality degradation for economic or social reasons: ***"In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully"*** (*Federal Register*, Nov. 8, 1983).

*Response: This subbasin assessment is not a petition to degrade. No one has petitioned to lower water quality in the Lochsa River subbasin. Please refer to the discussion above in **Protection of Water Resource** of the anti-degradation provisions, and the tier 2 provisions to which the comment refers.*

- 2 Idaho has never quantitatively or adequately defined what supported or **fully** supported constitutes in terms of water quality, fish habitat, or fish populations.

Response: Idaho Water Quality Standards define full support of designated beneficial uses of water at IDAPA 16.01.02.40. Other useful references are: beneficial use is defined at IDAPA 16.01.02.04, and existing beneficial use is defined at IDAPA 16.01.02.35.

- 2 You have presented no data or credible analysis to support your contention that beneficial uses in the Lochsa are being **supported or fully supported**.

Response: The data and analyses that DEQ used to make its full support calls are summarized in Sections 4.0, 4.1, and 4.2. Sections 3.1, 3.2, and 3.3 present water quality data and analyses and Sections 1.1 and 1.2 present data and analyses of physical and biological conditions that are crucial to understanding the subbasin's water quality. These sections fill 45 of 53 pages (85%) in the draft subbasin assessment. The 45 pages summarize voluminous data collected from 1895 to 1997 and found in publications including those of the Clearwater Basin Bull Trout Technical Advisory Team, Idaho Bureau of Mines and Geology, Idaho Division of Environmental Quality, Idaho Department of Fish and Game, Idaho Department of Water Resources, National Oceanics and Aeronautics Administration, Natural Resource Conservation Service, U.S. Forest Service, and the U.S. Geological Survey. The DEQ considers these the best available data about the Lochsa River subbasin and has found that they support the

beneficial use support determinations made in accordance with IDAPA 16.01.02.053 and the recommendations of the subbasin assessment.

- 5** The term “supporting beneficial uses” is not defined in the document. We are confused that the document claims all the streams are supporting their uses (i.e., fish populations).

Response: The DEQ agrees that the language in the Public Comment Draft could cause confusion. The wording has been revised to clarify that the water quality in the streams can support the designated beneficial uses. As discussed above, other factors affecting fish populations vary independently from water quality.

- 6** The assessment fails to define what standards are to be used in determining what does and does not fully support beneficial uses. Without an adequate definition, any stream could be seen as supporting fisheries despite the reality of the population’s health.

Response: Section 2.2. describes the applicable water quality standards. Please refer also to the discussions above of the full support definition and data used to make those calls. Again, please consider the difference between water quality capable of supporting beneficial uses and fish populations as discussed above.

BURP

- 2, 6** DEQ has relied heavily on data and criteria derived from their BURP procedure. This is a fatal flaw as the BURP methodology has not been peer-reviewed and accepted by the scientific community.

Response: Idaho’s Water Body Assessment Guidance (WBAG) requires that DEQ incorporate biological parameters into its beneficial use support determinations. The WBAG received external review. The DEQ formed a Technical Review Committee (TRC) for the purpose of providing review and comments to a variety of projects, including the WBAG, in early 1996. The TRC was made up of industrial, environmental, and agency scientists and representatives. Comments from the TRC were used in revisions to the WBAG.

The WBAG was described at the Seventh Annual Biological Assessment Workgroup meeting in Astoria, Oregon to a large group of Pacific Northwest aquatic scientists in 1996. Numerous copies of the draft and final document were printed and circulated for comment and information. A presentation of WBAG using real data was made to each BAG in 1996. DEQ answered questions at each of these presentations.

WBAG was incorporated into Idaho’s water quality standards at IDAPA 16.01.02.053. The public had the opportunity to review and comment during the rule making, as well as during the Health and Welfare Board review process and final passage by the legislature.

- 5, 6 The BURP methodology is not described. We understand that the BURP assessment has not been approved by the EPA, nor has it been peer-reviewed or accepted by the scientific community.

Response: EPA has recognized Rapid Bioassessment as a valid water quality assessment tool. The states of Ohio and Delaware have assessment processes very similar to Idaho's, that rely heavily on macroinvertebrates to make beneficial use determinations. Their processes are supported and approved by their respective EPA regional offices. Idaho's metric use within the MBI match up very well with those recommended and used in the Pacific Northwest (Karr and Chu, 1997). Additionally, the DEQ expects the BURP protocol to continually evolve as the scientific community's understanding of bioassessment expands.

- 6 It is not appropriate for the DEQ to base its study and criteria on procedures taken from Idaho's Beneficial Use Reconnaissance Project (BURP).

Response: The DEQ believes that the aquatic macroinvertebrates that live in Idaho's waters are a better reflection of the water quality than the use of water quality chemistry alone. The DEQ feels that biology should be the final arbitrator in determining water quality status.

More information about BURP can be found in Chapters 1 and 4 of Idaho's 1998 303(d) list.

Dams

- 5 There is no discussion of the effect of dams on anadromous fish populations.

*Response: The subbasin streams are free flowing and are protected as such (See **Wild and Scenic Rivers** section). Slackwater from Lower Granite Dam ends roughly at Lewiston, more than 90 miles downstream of the mouth of the Lochsa River and thus does not affect the water quality in the Lochsa River subbasin. The effect of downstream dams on anadromous fish populations is outside the scope of this water quality document.*

Improved Water Quality Standards

- 6 It is time that the DEQ in Idaho begin adopting standards for water quality that are at least as stringent as the Clean Water Act prescribes.

Response: Idaho first promulgated water quality standards in the 1970s. The Clean Water Act intends that the states establish water quality standards. The regulations the states follow are found at 40 CFR Chapter 1, Subpart B, Section 131.10.

- 6 We believe that it is due time for the DEQ to begin advocating improved water quality standards within Idaho.

Response: The DEQ concurs that water quality standards can be improved and has been advocating improvement. For example, Chapter 3 of Idaho's 1998 303 (d) list includes a twenty-five page discussion advocating improved temperature criteria.

- 8 We recommend that the State consider revisions to its temperature criteria to fix the discrepancy between the criteria and observed natural conditions which support indigenous populations of fish and wildlife as described in section 303 (d) of the Clean Water Act. The Forest's temperature monitoring data show that natural stream temperatures in many of the streams in the Lochsa subbasin occasionally exceed Idaho's current temperature criteria.

Response: Problems with water quality criteria are being discovered all over the country. Criteria may have been adopted decades ago when our understanding of water quality was less than at present. Criteria may have been based on studies with a small number of species in controlled conditions in a laboratory. When scientists evaluate what is actually happening in a stream, they often find that a "one size fits all" criterion does not correspond to reality in that natural system.

The sediment regime in the Lochsa River subbasin provides an example of how difficult defining appropriate numeric criteria can be. The natural sedimentary processes do not have steady-state rates of deposition, but rather we expect periods of relatively low sedimentation to be interrupted by much higher loads every ten to fifteen years. How would a numeric criterion describe such a condition?

The water temperature regime in the Lochsa River subbasin is the case in point. Some numeric criteria are regularly exceeded, but it is clear that these temperatures are natural in this system. Developing criteria that work in the real world, i.e., provide for protection, maintenance, and improvement of water quality while accounting for natural environmental variability is no small task, but is underway in Idaho.

Public Involvement

- 2 The assessment attempts to make a case that very little development activity is taking place in the subbasin. In the process, the document attempts to extol the virtues of the Forest Service in this situation. As a matter of fact, the relatively low levels of timber harvest and road construction are attributable to the Public's involvement with the issues.

Response: The assessment is not trying "to make a case." It is merely reporting the present status of development in the subbasin, which is mostly managed by the Forest Service. The DEQ agrees that public involvement is an important part of managing public lands and thanks the public for its involvement in this assessment of subbasin

water quality through these comments and participation in the Clearwater Basin Advisory Group efforts.

Other

- 6 Idaho is respected and revered for its amazing natural beauty, wild rivers and clean waters. It would be a tragedy for fish, rivers and Idaho's economy to do anything but toughen criteria for the Lochsa subbasin.

Response: This statement confirms the findings of the Lochsa Subbasin Assessment. The DEQ agrees that the waters in the Lochsa River Subbasin are clean. Idaho's citizens have used Idaho's water quality standards to keep the waters clean. The DEQ will work to improve its standards, monitoring, etc. to optimize water quality protection as our science and technology develop. The DEQ disagrees that criteria in the Lochsa subbasin need to be toughened when the water's quality is clean and the data show it has improved since the 1975 onset of water quality standards under the Clean Water Act.

- 5 You assert that there is no correlation between forest "management" and sediment, nor between sediment and fisheries health. Your "proof" for these statements is pulling 2 lines from a USFS study, and 1 line from another study... "Postoffice Creek is not an unmanaged drainage."

Response: The assessment does not assert that there is no correlation between forest "management" and sediment, nor between sediment and fisheries health. The subbasin assessment is an evaluation of water quality conditions specific to the Lochsa River subbasin, and is not a literature review of all work about sedimentation.

The cited work of Parker, Lee, and Espinosa (1989) is particularly relevant because that 35- page report evaluated fish populations and sediment in the Lochsa subbasin and four of the five streams it studied were placed on the 1996 303 (d) list. Please refer to the response below for more detail on those worker's findings. The report's finding that, "Relationships between fish populations and sediment levels were evaluated and were not interrelated" is important to note because it confirms later work used to make the status calls on subbasin stream water quality.

*Section 3.1. of the assessment points out that the USFS continually "reviews and revises" processes used to evaluate conditions, and that it has noted that processes used in the past may have resulted "in a low forest service classification because of natural conditions in a watershed, not only because of management disturbances." Please refer to the response under **Cobble Embeddedness** and section 3.2. for the results of the latest work on this topic in the Lochsa subbasin.*

- 2, 5 You failed to reference Huntington (1995)... Surely there are more studies on the correlation of sediment and fish health which you chose to ignore.

*Response: The Huntington report focuses on **fish habitat, not water quality**, consistent with its title Fish Habitat and Salmonid Abundance Within Managed and Unroaded Landscapes on the Clearwater National Forest, Idaho . The DEQ may use habitat indices to indicate beneficial use support status when its primary means to identify and interpret stream water quality are inconclusive. The Huntington report is not restricted to the Lochsa subbasin, but compared large woody debris, pools, bank stability, and substrate composition among streams across the Clearwater National Forest. The substrate section includes a comparison of cobble embeddedness values between “managed” and “roadless” areas that “generally found higher cobble embeddedness in streams within managed landscapes.” That section includes the important observation that, “Comparisons between managed and unroaded streams based on their respective ranges of variation in cobble embeddedness showed only minor difference between the two landscape treatments. For all channel types and treatments, at least a small number of reaches on the CNF exhibit either extremely high or relatively low cobble embeddedness.” These observations are very consistent with the recent work of the forest hydrologist discussed in the **Cobble Embeddedness** section and presented in section 3.2. (Jones, 1999) that may explain those observations.*

Additionally, Huntington (1995) “...grouped E and G-type channels surveyed in 1993 with C and B-type reaches, respectively, because that is how those two types of channels were classified prior to 1993.” While that approach is valid for the purpose of comparing the 1993 data to earlier data sets, its utility is limited for understanding and explaining variations in cobble embeddedness because such grouping will clearly skew the data. Cobble and pebble dominated G-type streams tend to be very unstable, while the same particle sized B-type streams can be very stable. Similarly, the data tables displayed in section 3.2. (Jones’s, 1999) show that in the Lochsa subbasin E-type channels average greater than 70% embeddedness (whether roaded or unroaded), whereas C-type channels average about 20% lower embeddedness.

These are reasons why the groupings Huntington used would be expected to confound interpretation of the results. The DEQ did not “choose to ignore” studies because it did not agree with the conclusions, instead it presented works with a focus and methodology that best describe water quality in the subbasin.

- 1** Provide more details on the pollution control efforts, i.e., how many road miles have been obliterated, how many acres of riparian habitat has been restored.

Response: The details about road miles obliteration and riparian habitat restoration have been added to the subbasin assessment as suggested.

- 1 Brushy Fork was listed for sediment. The MBI is reported as 2.88. According to the subbasin assessment, an MBI “between 2.5 and 3.5 indicates that more information is needed to make a determination.” Has more information been collected?

*Response: Yes, the needed information was collected and used to make the support status determination as described above in the **Fish Data/Fish Population** section.*

- 2 The assessment has taken statements out of context to support their weak position. On page 21, they quote Espinosa *et al* (1997) on the awareness of watershed problems that led to a moderation of timber and road construction impacts in the early 1980s.

Response: The DEQ disagrees that the statement was taken out of context. The commentator was quoted describing how forest management practices improved following the initial period of logging from the 1950's through the 1970s, leading to “a moderation of timber and road construction impacts in the early 1980s.”

Here DEQ quotes an entire paragraph on the Pete King Creek drainage from the commentator's paper to confirm the context.

“Since 1973, sediment yield in Pete King has declined significantly as road construction and timber harvest dropped-off sharply; although it still remains elevated. To this day, timber and roading projects are still being carried out and planned for the watershed. In the 1990s, sediment yield approached levels of <35% over natural, a threshold level estimated as necessary by the CNF for recovery to be initiated. Without monitoring and feedback to the management system, it is likely that sediment yields would have remained at levels of 60% to 100% over natural during the decade of 1983 to 1993. The Pete King Creek monitoring program was conducted at a frequency and intensity great enough to provide feedback to management on trends in fish habitat quality so irrefutable that the sustained impacts of an aggressive timber program could no longer be overlooked.” (Espinosa *et al.*, 1997)

The citation describes improved trends in sediment yield as a result of changed forest management practices, changes which were based , at least partly, on feedback from the associated monitoring program.

- 2 DEQ is wrong when it states that Post Office Creek is an unmanaged drainage (p. 23).

Response: The DEQ is not stating that Post Office Creek is an unmanaged drainage; the DEQ is quoting a paper co-authored by the commentator which said it was. The following quotations are from the Abstract of the quoted

reference, Lochsa River Tributaries Sediment and Fish Monitoring Report 1989 by Parker, Lee, and Espinosa (*The bold-face emphasis was added in the following quotations*).

“The goal of this study was to monitor sediment levels and fish populations in a series of representative streams in managed and unmanaged drainages. Evaluated drainages included: Weir Creek (unmanaged), **Post Office Creek (unmanaged)**, Squaw Creek (managed), Papoose Creek (managed) and Brushy Fork (managed)...Managed streams were not more heavily embedded than unmangaed streams. The highest sediment levels documented were in Post Office Creek, **an unmanaged drainage**...Relationships between fish populations and sediment levels were evaluated and were not interrelated.”

In the Results and Discussion section (pp. 18-23) of the cited paper, the discussion of Post Office Creek includes the following:

“This was the second control drainage. Although it does contain some roads, it was sufficiently undeveloped to be a control drainage...Because of the lack of management activity near the stream edge, it was expected that the embeddedness levels would be similar to the levels documented for Weir Creek. In fact, the mean sediment levels for each habitat type were the highest documented in any of the study streams...The west-facing slopes above and below station one were previously burned and have only partially regenerated. The lack of total regeneration allows the continued loss of sediment into the stream...**All documented sediment came from natural sources, not from management activities**...Fish populations within this stream were excellent, despite the high levels of embeddedness...densities in Post Office Creek were generally superior to densities in other drainages.”

The Summary section concludes with,

“It would be most beneficial to continue to monitor the fish populations within the Weir Creek and **Post Office Creek** drainages. The **pristine nature** of those systems will provide valuable information on long-term fluctuations of **unaltered** salmonid populations and also for use in comparison with managed drainages.” (Parker, Lee, and Espinosa, 1989)

The DEQ understands that road segments entered the east side of the Postoffice Creek drainage in 1935 (road #566) and in 1940 (road #565). Roads entered the west side of the drainage in 1968 to facilitate some harvest in 1969. Additional road expansion in the 1980s linked the Postoffice Creek drainage with Doe Creek to the east. Logging was conducted in the early to mid-1980s. In 1989 additional access was developed to the Deep Saddle cut. These are the conditions that the DEQ understands to have existed in the Postoffice Creek drainage through the

year of publication of the referenced paper. It is important to note that the papers author's considered these conditions to exist in the "pristine nature of this "unmanaged" drainage to the extent that they considered it useful as a "control drainage."

In 1990, an access road was constructed up the west side of the drainage to a helicopter logging pad. In 1992, helicopter logging was conducted using this pad.

- 2** The State of Idaho's intent is to remove every stream segment from the list; and thus, nullify the intent and substance of the Clean Water Act.

Response: The ultimate objective of the Clean Water Act is "... to restore and maintain the chemical, physical, and biological integrity of the Nation's water." The 303 (d) list is a listing of water quality limited streams. Removing streams from the list is the "intent and substance" of the Clean Water Act.

